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No. 766

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## ENERGY, FUELS, AND RELATED EQUIPMENT

### FRG STUDY SEES NO SOVIET OIL SHORTAGE

West Berlin DIW WOCHENBERICHT in German 15 Dec 77 pp 427-432

[Text] Various predictions have recently been heard in the West, according to which the USSR would soon become a net importers of oil. This would be bound to affect oil prices and East-West trade. An analysis of the situation prevailing in the USSR's oil industry and its presumable future development shows, however--despite the necessary reservations with respect to such forecasts--that pessimistic appraisals are not justified at the present time.

Since 1974 the Soviet Union has been the world's largest oil producer. Some 70 percent of the Soviet yield are consumed at home, the remainder--in 1976 approximately 110 million tons of crude oil and just under 40 million tons of oil products--are exported. Oil exports enjoy economic significance from several aspects:

- In 1976 they accounted for more than 25 percent of total Soviet export earnings. The USSR received \$5.5 billion from these deliveries (oil including oil products) to Western industrial countries; that is more than 50 percent of its total earnings of convertible currencies. Measured by the import needs of the Western industrial countries, however, Soviet oil deliveries account for only 5 percent.
- With the exception of Romania the CEMA countries meet their oil needs pretty exclusively from the USSR. In 1976 they purchased some 75 million tons, that is nearly 90 percent of their total import requirements. These countries therefore needed to spend only a small proportion of their scant convertible foreign exchange for oil imports from the OPEC countries. These moneys were thus available for other imports, especially machinery.

The satisfaction of future CEMA oil needs and exports to Western countries depends on the USSR's success in continuing to raise oil output. Some observers consider this unlikely. A study by American Government circles<sup>1</sup> concludes that the USSR is going to fall far short of even its five-year target, that is the production of 630 million tons of oil in 1980. According

to this study oil production would begin to stagnate by the end of the 1970's and decline no later than the early 1980's. In 1985 the output volume would amount to only 400-500 million tons (estimate for 1977: just less than 550 million tons).

The origins and consequences of this assumption are described as follows:

-- The exploration of new oil deposits has not kept step with production. Although extensive oil reserves do exist in the Arctic, eastern Siberia and the off-shore regions, any development of new fields is likely to take 8-10 years. At this time development has nowhere advanced sufficiently to offset the decline of oil production in the fields now operating.

-- According to the plan data nearly half the 1980 Soviet production (310 million tons) is to be provided by West Siberia. This target will, however, be missed by 50 million-90 million tons because Samotlor, the USSR's largest oil-field, will achieve maximum output in 1978 and no other field with comparably large reserves has hitherto been developed.

-- Analogous to the United States which currently import 400 million tons of oil, the USSR will in future have to buy substantial quantities of oil from the OPEC countries. Instead of the revenue of foreign exchange in the amount of \$5.5 billion accruing from current oil exports, more than \$10 billion will then have to be spent on oil imports. Hardly any money will be available for other imports from the West (1976: \$14.5 billion), and the repayment of outstanding loans will meet with considerable difficulties.

-- The other CEMA countries also will have to use their foreign exchange increasingly for oil imports from the OPEC countries, because the USSR will at best be able to supply small quantities only. The 1985 oil needs of the USSR and the other CEMA countries are estimated at 175 million tons.

-- As a consequence of this development East-West trade will shrink. This will mean a deterioration in the growth chances of the East and in the sales opportunities of the West. Furthermore, the additional demand by the Soviet Union and the other CEMA countries for OPEC oil will result in the shortage of oil and generally drive up prices once again.

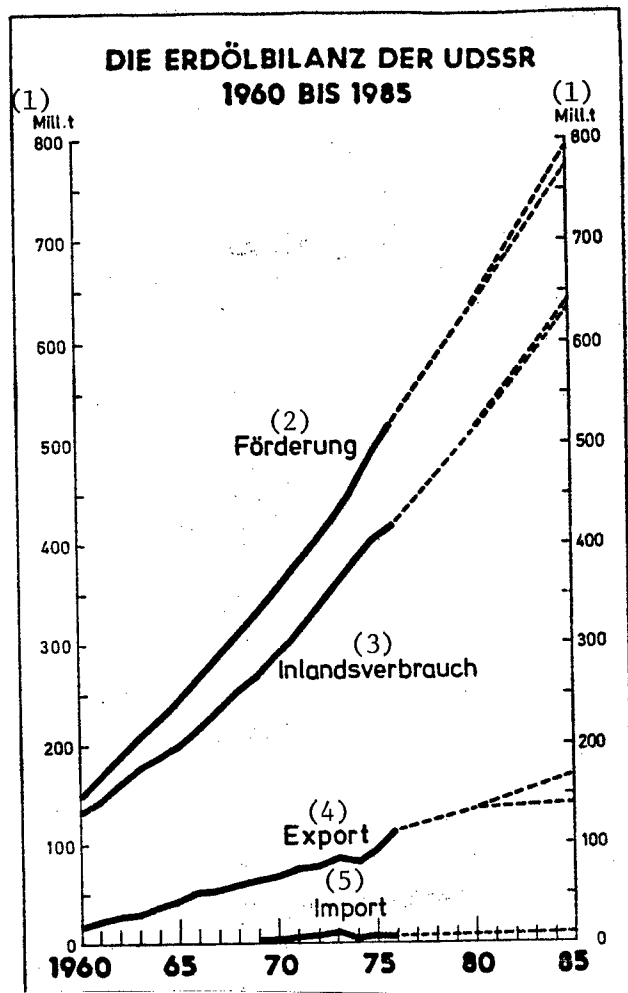
It is to be expected, though, that these foreseeable effects would spur the Soviet economic leadership to prevent a decline in oil production by the appropriation of adequate investment resources. A decline is therefore unlikely, although the rise in oil production will probably not continue to the former extent.

#### Oil Production: Decline in Growth Rates

In recent years Soviet oil production has risen steadily and, usually, more rapidly than world oil production, so that the USSR was able to raise its percentage share in total yield to nearly 20 percent. Following the "take-off"



Graph 1--The Oil Balance Sheet of the USSR 1960-1985



Key:

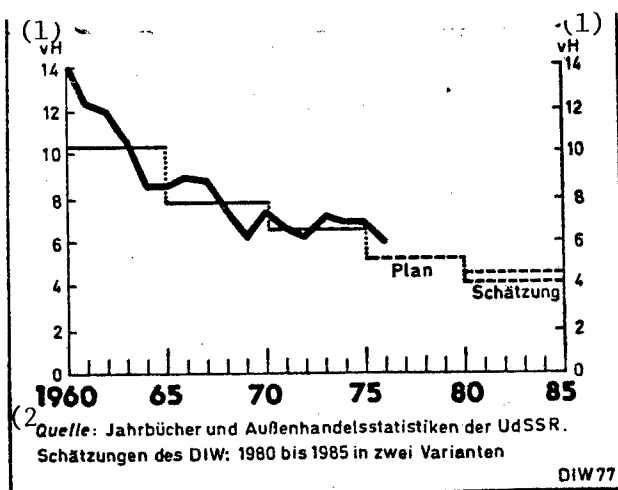
- |                         |            |
|-------------------------|------------|
| 1. Million tons         | 4. Exports |
| 2. Production           | 5. Imports |
| 3. Domestic consumption |            |

phase in the mid-1960's, however, the trend has been toward a declining growth rate. It is expected that the 1977 growth rate will amount to just above 5 percent. Though this means a slight shortfall in the annual target (550 million tons), it would be premature to take it as an indication that the five-year plan as a whole will not be fulfilled.

Western Siberia is now the focus of oil production. In the current five-year plan production here is to be raised from about 150 million tons to 310 million tons, a goal originally envisaged for 1990. The development of the West Siberian deposit has been so strongly emphasized because output in the European and Central Asian oilfields no longer holds out prospects for much growth. The Soviets did not insist on beginning production only after the

complete survey of a deposit. The interval between discovery and utilization of the field was consequently shortened.

Graph 2--Growth of Soviet Oil Production Compared to Preceding Year  
(percentage)



Key:

1. Percent
2. Source: USSR Yearbooks and foreign trade statistics. DIW estimates: 1980-1985 in two variants.

Further large quantities of oil remain to be developed and produced in West Siberian fields. Up to this time the "exploration deficit" in West Siberia is quite substantial. Compared to the Volga-Ural region only 5 percent per square kilometer of drilling meters were sunk in the Tyumen region<sup>2</sup>; extensive discoveries, therefore, must still be expected. Moreover, the deposits so far explored are only in partial production now: By 1976, according to Soviet data, a total of 145 oil and natural gas deposits had been discovered in West Siberia; only 26 of them are so far industrially exploited.<sup>3</sup> This provides the Soviet oil industry with substantial fall-back opportunities once output can no longer be raised in the fields now being exploited.

#### Regional Structure of Soviet Oil Production (Percentage of Domestic Production)

	1965	1970	1975	1980
				(Plan)
Volga-Ural region	71	59	46	36
West Siberia (Tyumen)	0	9	30	48
Others	29	32	24	16

From now through 1980 output is to be further expanded on the so far largest discovered oilfield of the USSR (Samotlor near Nizhnevartovsk, West Siberia) and raised from 122 million tons (1976) to 180 million tons (1980). In 1980, therefore, nearly 25 percent of the (planned) Soviet oil output would originate

in this field. There are no indications of acute production difficulties here; in fact the target was slightly exceeded in the first half of 1977.<sup>4</sup>

Admittedly, prospecting was neglected. Impressed by the initially unprecedented successes the means for exploratory drilling have been reduced ever since 1968 and the personnel cut back. As a result the geologists failed in both 1976 and 1977 (for the first time in 15 years) to meet the plan targets for the exploration of new deposits in the Tyumen region.<sup>5</sup> Though the problems which have arisen here still require resolution,<sup>6</sup> it seems premature to assume therefore that future oil production will experience bottlenecks. On the other hand it is true that oil production will continue to be more costly. Prospecting and, therefore, future production is shifting further toward northwest Siberia (Yamalo-Nenetsk region). In these areas the oil deposits occur at lower depths and the distance from the centers of consumption is greater.

#### The Proportion of Oil in Soviet Energy Consumption At Maximum Value Now

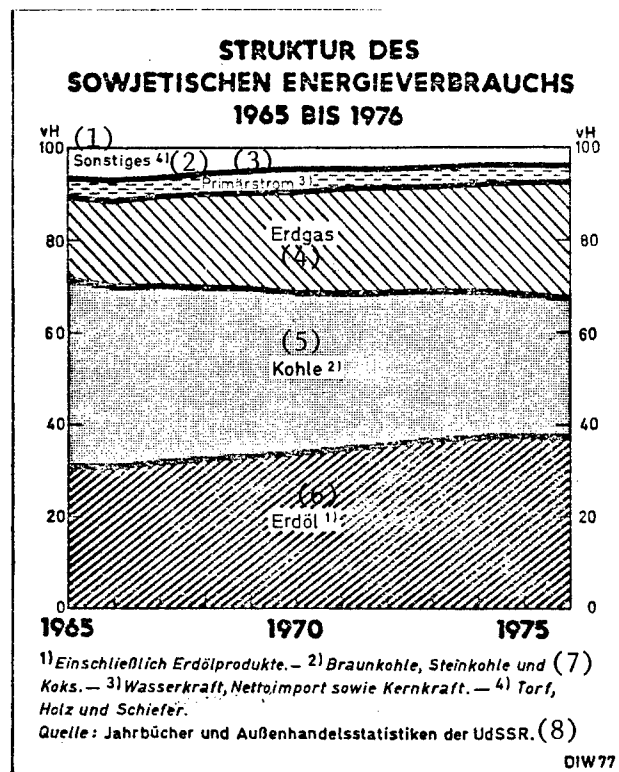
The high rates of growth in oil production have resulted in the expansion of the proportion of oil in Soviet energy consumption. In 1965 only 30 percent of domestic energy requirements were met by oil; this proportion steadily increased until 1975 to achieve 38 percent. In 1976 it declined slightly. Official data on the development of the Soviet economy in the current Five-Year Plan (1976-1980) indicate that it is intended deliberately to lower the rise in oil consumption, especially in the fuel sector. In the Volga-Ural region, for example, some major thermal power plants are to be converted from fuel oil to coal. In the medium range natural gas consumption, in particular, will continue to rise at an above average rate; in the longer term nuclear energy<sup>7</sup> is to meet an increasing proportion of energy needs. In this context it is to be expected that a constant proportion for oil in Soviet energy supplies will best correspond to the conceptions of the planners (end of the substitution stage).

In the last 10 years Soviet energy consumption has risen by an annual average of about 5 percent. Fluctuations in industrial production are clearly reflected in the development of consumption. However, energy consumption per product unit has tended to decline. Assuming that (1) 1976-1980 industrial production will rise according to plan, that is by an annual average of 6.3 percent and, subsequently, 6 percent, and that (2) specific energy consumption will in future decline more slowly than hitherto, it is possible to estimate the rate of increase in oil consumption at 4.7 percent per annum (1976/1980) and 4.8 percent (1980/1985).<sup>8</sup> The growth rate of oil output could therefore well decline slightly without endangering domestic supplies or necessitating a cutback in oil exports.

#### Oil's Domination of Soviet Foreign Trade

The price explosion on the world oil market brought the Soviet Union substantial additional earnings. Within 4 years the share of oil in total exports

Graph 3--Structure of Soviet Energy Consumption 1965-1976



**Key:**

- |                                  |  |
|----------------------------------|--|
| 1. Percent                       | 7. Footnotes: 1) Including oil products. |
| 2. Others <sup>4)</sup>          | 2) Brown coal, hard coal and coke.       |
| 3. Primary current <sup>3)</sup> | 3) Hydroelectric power, net imports      |
| 4. Natural gas                   | and nuclear power.-- 4) Peat, wood       |
| 5. Coal <sup>2)</sup>            | and shale                                |
| 6. Oil <sup>1)</sup>             | 8. Sources: USSR yearbooks and foreign   |
|                                  | trade statistics                         |

to the West doubled to 53 percent (1976). In the foreign trade sector this makes the Soviet Union more dependent than any other industrial country on the export of a single product or product group.

The price trend probably also helped the rapid expansion of the export volume (net). Last year alone two thirds of the additional production were exported. Despite the attraction of high world market prices and the earning of convertible currencies by sales to Western countries<sup>9</sup>, however, there has been little change in the regional pattern of Soviet oil exports. In 1976 as in 1973 the CEMA countries obtained 53 percent and the OECD countries 40 percent of Soviet deliveries; the remainder went to developing countries. The USSR is obviously trying largely to maintain Bloc self-sufficiency with respect to energy supplies, because its deliveries to the CEMA countries

(1976: 73 million tons) continue to meet nearly 90 percent of these countries import needs. However, since 1971 the CEMA countries can obtain additional oil and other raw material supplies from the Soviet Union only on condition that they participate financially in the rising investment costs.<sup>10</sup>

Table 1--Primary Energy in the USSR  
(Development of Yield and Consumption 1965-1976)

(4) Jahr	Förderung (1)		Inlandsverbrauch (2)		(3) Nettoexport	
	(5) in Mill. t SKE		Zuwachs gegen- über Vorjahr in vH	(7) Elasti- zität <sup>2)</sup>	(5) in Mill. t SKE	(8) in vH der Förde- rung
1965	953	852	7,5	0,86	101,0	10,6
1966	1 019	905	6,3	0,72	113,9	11,2
1967	1 072	948	4,8	0,48	122,4	11,4
1968	1 117	983	3,6	0,44	134,7	12,1
1969	1 171	1 027	4,5	0,63	143,9	12,3
1970	1 239	1 091	6,3	0,74	148,1	11,9
1971	1 302	1 152	5,5	0,71	149,7	11,5
1972	1 358	1 213	5,3	0,82	144,5	10,6
1973	1 424	1 270	4,6	0,61	154,4	10,8
1974	1 504	1 332	4,9	0,61	171,7	11,4
1975	1 595	1 397	4,9	0,64	197,6	12,4
1976	1 683	1 449	3,7	0,77	234,0	13,9

9) 1)Kohle, Erdöl, Erdgas, Holz, Torf, Schiefer, Wasserkraft sowie Nettoimport und Kernenergie.-2)Zuwachsrate des Primärenergieverbrauchs dividiert durch Zuwachsrate der Industrieproduktion.

10) Quellen: Statistische Jahrbücher und Außenhandelsjahrbücher der UdSSR, div. Jahrgänge.

Key:

1. Output
2. Domestic consumption
3. Net exports
4. Year
5. Million tons hard coal equivalent
6. Percentage increase compared to preceding year
7. Elasticity<sup>2)</sup>
8. As a percentage of output
9. Footnotes: 1) Coal, oil, natural gas, wood, peat, shale, hydro power as well as net imports and nuclear energy. 2) Growth rate of primary energy consumption divided by the growth rate of industrial production
10. Sources: USSR statistical yearbooks and foreign trade yearbooks, various issues

Not only this provision but also the rise in prices may have caused the CEMA countries to cut back the rise in oil consumption. Soviet crude oil deliveries to the CEMA countries will therefore increase only half as fast this five-year plan period as they did in 1971/1975. In 1980 they will achieve a total of about 92 million tons. If, for the period 1981/1985, we calculate a growth rate of Soviet deliveries to the CEMA countries slightly above the estimated energy consumption in these countries (4 percent per annum), the

resulting export volume amounts to 114 million tons (4.3 percent per annum) or 17 million tons (5 percent per annum).

Table 2--Oil Imports<sup>1)</sup> From the USSR of the CEMA and OECD Countries

(2) Bezugs- länder	1 9 7 2		1 9 7 4		1 9 7 6		1 9 7 2		1 9 7 6		Ölexporte in vH der Lieferungen der UdSSR (1)	
	Gesamt (3)	darunter Erdöl (4)	Gesamt (3)	darunter Erdöl (4)	Gesamt (3)	darunter Erdöl (4)	Gesamt (3)	darunter Erdöl (4)	Gesamt (3)	darunter Erdöl (4)		
	(5) in Mill. t						(6) Anteil an den jeweiligen Importen				1972	1976
RGW-Länder gesamt (7) <sup>2)</sup>	54,5	49,1	63,1	58,5	72,7	68,0	86,5	87,2	87,6	88,8	12,3	20,1
darunter:												
8 Bulgarien	6,4	6,4	9,0	9,0	10,0	10,0	77,1	77,1	92,6	92,6	10,6	20,0
9 CSSR	12,9	11,9	14,8	14,3	17,2	16,3	94,2	94,4	94,0	95,3	16,8	25,3
DDR 10	11,5	11,2	14,4	14,1	16,8	16,0	74,7	75,2	92,3	88,9	9,7	16,7
Kuba 11	6,6	4,7	6,5	5,2	7,3	6,8	100,0	100,0	100,0	100,0	15,0	21,3
Mongolei 12	0,3	-	0,4	-	0,4	-	100,0	-	100,0	-	5,2	5,4
Polen 13	11,0	9,7	11,1	9,8	13,1	11,7	91,7	100,0	71,6	77,5	13,9	21,5
Ungarn 14	5,8	5,2	6,9	6,1	7,9	7,2	86,6	85,2	81,4	81,9	10,4	21,3
EG-Länder gesamt 15	21,5	12,7	18,4	7,3	32,9	19,6	3,2	2,2	6,1	3,8	25,1	54,4
darunter:												
16 Frankreich	3,2	1,8	1,1	0,2	3,4	1,7	2,5	1,5	2,8	1,4	22,3	48,1
17 Bundesrep. Deutschland	6,0	2,9	6,8	3,1	8,9	4,5	4,2	2,8	8,1	4,3	37,0	61,4
18 Italien	8,8	7,3	5,8	3,9	10,1	8,9	7,1	6,1	9,7	8,7	47,8	73,3
19 Niederlande	1,2	-	2,1	-	2,5	0,1	1,6	-	3,8	0,2	26,0	60,1
20 Großbritannien	0,2	0,2	0,6	0,2	4,0	3,1	0,2	0,2	4,4	3,4	1,0	33,8
Obrige OECD- Länder gesamt 21	18,2	9,4	17,4	7,6	22,9	12,7	2,7	2,0	3,2	1,8	29,0	51,7
darunter:												
Finnland 22	8,8	6,0	9,4	6,2	9,9	7,0	67,2	65,2	70,7	63,1	54,5	64,5
OECD-Länder gesamt 23	39,8	22,1	36,0	15,1	55,8	32,3	3,0	2,1	4,5	2,6	26,8	53,3

1) Erdöl und Erdölprodukte. - 2) Ohne Rumänien, das kein Erdöl aus der UdSSR importiert. (24)

Quellen: Statistische Jahrbücher und Außenhandelsjahrbücher der RGW-Länder; OECD (Hrsg.): Oil Statistics; Schätzungen des DIW. (25)

**Key:**

- |  |                         |
|--|-------------------------|
| 1. Oil exports as a percentage<br>of USSR deliveries | 7. Total CEMA countries |
| 2. Purchasing countries                              | 8. Bulgaria             |
| 3. Total   | 9. Czechoslovakia       |
| 4. Oil   | 10. GDR                 |
| 5. Million tons                                      | 11. Cuba                |
| 6. Share in respective<br>imports                    | 12. Mongolia            |
|  | 13. Poland              |
|  | 14. Hungary             |

[Key continued on following page]

- |                                 |   |
|---------------------------------|---|
| 15. Total EC countries          | 24. Footnotes: 1) Oil and oil products, |
| 16. France                      | 2) Excluding Romania which does not     |
| 17. Federal Republic of Germany | import oil from the USSR                |
| 18. Italy                       | 25. Sources: Statistical yearbooks and  |
| 19. Netherlands                 | foreign trade yearbooks of the CEMA     |
| 20. Britain                     | countries; OECD (publishers): "Oil      |
| 21. Total other OECD countries  | Statistics"; DIW estimates              |
| 22. Finland                     |   |
| 23. Total OECD countries        |   |

The Soviet Oil Balance Sheet--Outlook for 1980 and 1985 in million tons

	1975	1980	1 9 8 5	
			Variant	
			a <sup>1)</sup>	b <sup>2)</sup>
Production	491	632	770	790
Imports	6	8	10	10
Total yield	497	640	780	800
Domestic consumption	404	508	642	633
Exports, total	93	132	138	167
To the CEMA countries	67	92	114	117
To other countries	26	40	24	50

1) Rise in production of 4 percent and rise in consumption from 4.8 percent in the average of the years 1985/1980. 2) Rise in production and rise in consumption of 4.5 percent in the average of the years 1985/1980.

Sources: Statistical yearbooks and foreign trade statistics of the CEMA countries as well as DIW estimates

Two variants of the future possibilities for exports to the West may be estimated from the assumptions on the development of production, domestic consumption and CEMA deliveries. Both variants assume the priority of deliveries to the CEMA countries so that fluctuations in the export potential affect only the figures for deliveries to the OECD countries. In the least favorable case (lower rise in the rate of production, greater rise in consumption) the USSR will be able in 1985 to export some 25 million tons of oil to Western countries. In the best possible case the export volume might actually rise to 50 million tons.

#### Outlook

In view of the few data on explored oil deposits, forecasts on Soviet oil production tend to be particularly hazardous. Currently there are no signs, though, indicating any unplanned stagnation in the short term. Difficulties

such as predicted by the Americans imply such drastic changes in East-West relations as would be extremely undesirable for the USSR. Therefore the Soviet Union would probably be ready to make available additional investment resources for the oil industry whenever a collapse of production would seem to threaten. It seems realistic, as a consequence, to assume a stable production growth for the period through 1985. This will facilitate not only the adequate supply of oil for the Soviet Union and the other CEMA countries but, in addition, oil deliveries to the West--albeit possibly at a declining rate.

#### FOOTNOTES

1. Central Intelligence Agency: "Prospects for Soviet Oil Production," Washington, April 1977. The same agency: "Soviet Economic Problems and Prospects," Washington, July 1977.
2. PRAVDA, 10 August 1977.
3. SOTSIALISTICHESKAYA INDUSTRIYA, 18 June 1976.
4. IZVESTIYA, 3 July 1977.
5. PRAVDA, 10 August 1977.
6. One of the major problems is the lack of supplies for the personnel employed. In addition to the defective infrastructure the greatest lack is that of housing. Only 1.5 million people live in the Tiumen region, at 1.75 million square kilometers 6 times larger than the Federal Republic of Germany. Furthermore, despite considerable material incentives the extreme climatic conditions make it very difficult indeed to recruit manpower for West Siberia.
7. See "Trends of the East European Electricity System, Expansion of Nuclear Power Plants in CEMA," edited by Jochen Bethkenhagen, DIW WOCHENBERICHT No 51-52/1975.
8. This is a "cautious" forecast. It is not impossible that energy savings measures will again be intensified.
9. In accordance with the price fixing principles for the CEMA intra-Bloc trade the CEMA countries are currently obtaining Soviet oil at prices which, though rising steeply, are still below world market prices. See "The CEMA Countries Energy Supplies in the Sign of Price Rises," edited by Jochen Bethkenhagen, DIW WOCHENBERICHT No 2/1977.



10. "Since 1971 any improvement in the CEMA member countries supplies of raw materials and fuels has depended on the interested countries participation in the USSR's increased investment expenditure involved in oil, natural gas, copper, pulp and asbestos production. For the period following 1975 this agreement is also in effect for...electric energy." See Gerhard Kraft: "Die Zusammenarbeit der Mitgliedslander des RGW auf dem Gebiet der Investitionen" [The CEMA Member Countries Cooperation in the Investment Field], East Berlin 1977, p 56.

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CHARACTERISTICS OF YUZHNO-EMBENSK REGION

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77 pp 9-12

[Article by G. M. Yarikov, Ye. A. Gogina, G. P. Zolotukhina, VolgogradNIPINeft' Institute]

[Text] Well 1-Karaton is located in the Yuzhno-Embensk oil-bearing region, in the subsalt uplift dome of Karaton in the eastern part of the Caspian Basin. At a depth of 3,904 meters it revealed the Verkhneartinsk deposits of the Lower Permian, and at a depth of 3,972 meters, it went into the lower section of the Carboniferous System, which is represented by the Vizeysk and Turneysk stages with a total thickness of 1,028 meters.

Lower Carboniferous. On the whole, its section is of the platform type and almost completely made up of carbonaceous rock.

The Turneysk Stage is represented by the Likhvinskiy Substage made up of the Zavolzhskiy, Malevskiy and Upinskiy horizons and the Chernyshinskiy Supra-horizon made up of the Cherepetskiy and Kizelovskiy horizons.

The Zavolzhskiy horizon is made up of pure and uniform limestones. With respect to the fauna complex, it can be divided into two parts, lower and upper. The lower one (5,000 to 4,913 meters deep) corresponds to the zones of thick *Eoendothyra communis* and *Septatournayella rauserae*. It is represented by brown-grey jointed, porous limestones and in places porous-cavernous, thin plate limestones. The structure of the greater part of them is organogenic-plastic, with interlayers, fine lump, slime detritus, crypto and fine grainy. In the foraminifer complex thick *Eoendothyra communis* (Raus.), a few *Septatournayella*, single-chamber *bisfera* and also *nodosinella* algae (depth 4,967 to 4,961, 4,961 to 4,960 meters) were encountered. Somewhat higher (depth 4,932 to 4,927 meters) in the micrograin limestones the complex becomes sharply poorer. It is made up of the single chamber foraminifers *parathurammina*, *bisfera*, and so on and also rare *nodosinella* algae. At the very bottom of the section (the 5,000 to 4,994 meter interval) the limestones are dark grey, fine lump (algae), with microcluster interlayers. The above enumerated single-chamber foraminifers were determined, with the exception of the species of *vicinesfera*. The upper part (depth 4,913 to

4835 meters) corresponds to the Quasiendothyra Robeitusana zone. It is made up of fine lump limestones, microcluster, detritous, micrograin, organogenic interlayers (coral and algae composition), organogenic-clastic. The thick Quasiendothyra Robeitusana Raus. forma tupica and also the eoendotyra and single-chambered forms, bisfera are noted in the foraminifer complex (interval 4,903 to 4,897, 4,862 to 4,857 meters).

The Malevskiy horizon (4,835 to 4,821 meters deep) is made up of grey, fine lump limestones, the organogenic-clastic, microcluster with sharp detritous of crinoida, shells of protozoa and fragments of algae. The age of the indicated rock is determined by the foraminifer complex which is made up of the bisfera, parathurammina, vicinispheera (depth 4,835 to 4,828 meters).

The Upinskiy horizon (interval 4,821 to 4,773 meters) is made up dark grey, dolomitic, unequally grained, thin plate, weakly porous limestones. In contrast to the Malevskiy rock the foraminifers in them are represented by sparse Parathurammina Suleimanavi Lip. Fragments of algae and limbs of crinoida, the shells of barchyopoda and sponge spicules are encountered in the detritus.

The Cherypetsk horizons (4,773 to 4,730 meters deep) is also made up of organogenic-clastic limestones, recrystallized, jointed, weakly porous, with well rolled detritus of crinoida, algae and barchyopoda. At a depth of 4,773 to 4,780 meters, the first multichamber plectogyra appear among the single-chamber foraminifers (the bisfera, parathurammina).

The Kizelovskiy horizon (depth 4,730 to 4,659 meters) is represented in the upper part by grey strongly jointed, thin plate, organogenic-clastic limestones, and in the lower part, by almost the same rock, but as a rule made up of different rolled fragments of the limestone with respect to size (0.1 to 5.0 mm), and most frequently algae, crinoida and foraminifers, often strongly granulated. The foraminifer complex encountered in the above-indicated rock is represented by numerous plectogyra, tournayella and other genres characteristic of the Kizelovskiy age. The appearance in the upper part of the first early Vizeysk species Palaeotextularia diversa Tchern indicates the gradual replacement of the Turneysk deposits by Vizeysk.

The Vizeysk Stage is represented by the Malinovskiy, Yasnopolyanskiy supra-horizons made up of the Bobrikovskiy and the Tul'skiy horizons, and the Okskiy made up of the Alekasinskiy, Mikhaylovskiy and the Venevskiy horizons and the Serpukhov suprahorizon.

The Malinovskiy suprahorizon (the 4,659 to 4,504 meter interval) is completely made up of limestones. In the lower part they are black polydetritous, recrystallized, finely jointed; in the middle they are grey, organogenic-clastic, pseudoolotic, detrital, thin plate. In the organogenic-clastic and polydetritous limestones, along with the numerous plectogyra, there are thick dainella--Dainella tenuissima Vdov, D. chomatica (Dain) forma staf-felloides, globoendotira and eoparastaffella characteristic of the Malinovskiy suprahorizon.

The Bobrikovskiy horizon (4,504 to 4,434 meters deep) is predominantly isolated on the basis of the core lifted from its foot section. It is made up of grey, organogenic-clastic, porous, jointed, fine platy limestones. The foraminifers encountered in them distinguished by poor preservation are represented basically by *Plectogyra*--*Plectogyra formosa* Schlyk-- and *eoparastaffella*--*Eoparastaffella simplex* Vdov.; algae, corroded fragments of limbs from crinoidian corals are also noted. The indicated community is also similar to the previously encountered association of foraminifers from the Bobrikovskiy horizon in well 14-Tingutinsk drilled in the southwestern part of the Caspian Basin.

The Tul'skiy horizon can be divided into three parts: lower, middle and upper. The lower part (the 4,434 to 4,399 meter interval) is made up of dark grey organogenic-clastic, thin plate limestones with spicule and biomorphic interlayers. In the foraminifer, among the numerous *permodiscus* and also the *eoendotyranopsis* and the *eoparastaffella*, sparse *Archaeodiscus* ex. gr. *Krestovnikovi* Raus appear, which indicates the Tul'skiy age of the country rock.

The middle section (depth 4,399 to 4,355 meters) is represented by argillites with interlayers of marls and limestones. The argillites are usually silty, nonuniformly lime siderite, dense, heavy, in places thin layered. The interlayers become silty, clayey, siderite and weakly pyritized marls with carbonized plant detritous. The limestones are dark grey, weakly clayey, recrystallized with silicified, spicule sections and interlayers; more frequently they are fine and polydetritous, detritous, biomorphic, micro-grainy and nonuniformly grainy. In almost all cases (intervals 4,379 to 4,737, 4,369 to 4,363 meters) they contain thick *Archaeodiscus krestovnikovi* Raus, also thick *tetrataxis* on the whole characteristic of the Tul'skiy horizon.

The upper part (4,355 to 4,277 meters deep) is made up of limestones with argillaceous interlayers. In the lower half they are grey detritous, bi-morphoric-microcluster, organogenic-clastic, fine platey. Along with the above-presented forms there are thick *lituotubella*, *globoendotyra*, *endotyrapis*, *eoparastaffella*, which indicates the Tul'skiy age of the country rock.

The Aleksinskiy horizon (4,277 to 4,137 meters deep) is basically made up of detritous limestone (crinoid-algae composition), polydetritous, biomorphic, organogenic-clastic, jointed, thin plate. In the lower half we have the foraminifer complex which is made up of numerous *plectogyra*, *globoendotyra*, *crybrospira*. *Eostaffella mosquensis acuta* Raus. and so on are also noted in it. On the whole, this complex is characteristic for the boundary layers of the Tul'sko-Aleksinskiy age. In the upper half (depth 4,170 to 4,160 meters), along with the *plectogyra* and the *globoendotyra*, numerous species of the genus *eostaffella*, *otfalota* and other genres are observed standard for the Aleksinskiy deposits. Higher up in the section (4,148 to 4,142 meters) *Archaeodiscus moelleri* Raus. is noted; sparse *calcifoliuma* appear among the algae which permits their country rock to be associated with the upper part of the investigated horizon.

The Mikhaylovskiy horizon (interval 4,037 to 4,070 meters) is represented by grey, dark grey detrital limestones, polydetritous, biomorphic, relict biomorphic, organogenic-clastic, oolitic, thin platey, in places dolomitized limestones. The foraminifer complex in them is made up of the standard mikhaylovella, lituotubella, bradiin, and so on for the indicated horizon accompanied by abundant detritous of crinoida and algae.

The Venevskiy horizon (depth 4,070 to 4,011 meters) basically is made up of dark grey, organogenic-clastic, jointed, porous, thin platey limestones to varying degrees anhydritized and dolomitized. In the foraminifer complex encountered in the 4,047 to 4,041 meter range, among the eostaffella, the globoendotyra, the bradiin, lituotubella, the first representatives of the Yanishevskin and the surrounding pseudoendotyra appear. This permits certain classification of their country rock in the Venevskiy horizon.

The Serpukhovskiy suprahorizon (depth 4,011 to 3,972 meters) is basically made up of limestones with argillaceous center layers, with single thin layers of grey, finely dispersed, fine platey argillites. The limestones in the lower half of the section are dark grey, relict-organogenic, organogenic-clastic, jointed, fine platey, and weakly porous. The foraminifers, eostaffella and pseudoendotyra encountered in them and also the algae *Calci-folium okense* schweiz. et Bir are characteristic of the upper part of the Okskiy and the lower part of the Serpukhov suprahorizon.

The Lower Permian. Only the Verkhneartinskaya part (depth 3,972 to 3,904 meters) isolated by analogy with well 3 Karaton was preserved among the subsalt Lower Permian deposits in the section. It is represented by argillite-limestone series. The core taken from the 3,923 to 3,918 meter interval is made up of dolomitized limestones, argillaceous interlayers, with inclusions and insets of gypsum and anhydrite. The fine foraminifers *Nodosaria post-carbonica* Tehern., *Glinitzina minima* Raus. contained in them indicate, according to the conclusions of O. B. Ketat, the Lower Permian age of the country rock.

As is obvious from what has been discussed, the Lower Carboniferous deposits are basically represented by limestones. Their specific weight fluctuates from 2.35-2.39 to 2.68-2.73 grams per cubic cm.

The core and the industrial geophysical data demonstrated that the section is made up of alternating porous, in places cavernous porous, weakly porous and dense limestones. As a result of the AVPD effect, they are jointed, deconsolidated, fine platey, frequently rubbly to different degrees, forming a single hydrodynamic system in the Lower Carboniferous. Obviously, even the argillites of the lower half of the Tul'skiy horizon with marl interlayers cannot serve as a reliable cover for the lower-lying carbonaceous rock, for they are silty and obviously jointed. According to the laboratory data the porosity of the organogenic-clastic limestones fluctuates from 0.39 to 8.89 percent, the detritous limestones from 0.23 to 11.28 percent.

Although the majority of the rock of the Lower Carboniferous is porous, the values of their capacitive properties are low. Therefore the indicated limestones are classified as porous jointed collectors, in places of the jointed type. The dense rock (noncollectors) are nonuniformly grainy (micro-cryptograiny), small lump, sometimes detritous and even organogenic-clastic limestones. They usually are finely jointed, they do not have sufficient porous space or it is very small in them. The porosity of such rock according to the laboratory data does not go beyond the limits of 67 percent (more frequently 0.3 to 3 percent).

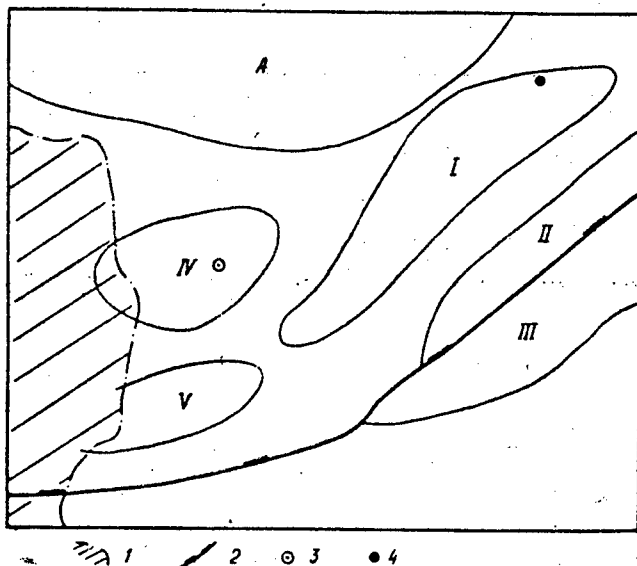


Diagram of the location of well 1-Karaton: 1--the Caspian Sea; 2--principal deep fault in the southeastern part of the Caspian Basin; Wells: 3--Karaton-1; 4--Biikzhal-1; A--Shukatskiy zone; uplifted zones: I--Biikzhal'skaya; II--Tugarakchan-Turesayskaya; III--Yuzhno-Embensk; IV--Karaton; V--Prorvinsko-Aznagulovskaya.

According to the classification of A. I. Krinari, the indicated rock are high and medium capacitive in the Aleksinskiy, Tul'skiy horizon, and in the upper most part of the Bobrikovski horizon, small capacitive, partially in the Mikhaylovskiy and Venevskiy horizons, and in the upper half of the Malinovskiy suprahorizon. The limestones are very low capacitive in all the remaining deposits of the Lower Carboniferous (see the figure).

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PROSPECTS OF OIL, GAS IN THE BOZOBA-KENKIYAK STRUCTURE

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77 pp 12-15

[Article by N. Ya. Kunin, L. I. Ioganson, VNIGNI Institute]

[Text] High effectiveness of the exploration work for subsalt deposits in the Caspian Basin occurring at great depths can be insured only by the discovery of oil and gas deposits.

At the present time the exploratory work for subsalt deposits is being carried out in areas prepared by seismic exploration using the reflected wave method and the common depth point method with respect to the first subsalt reflecting horizon  $\Pi_1$ . Significant errors in the depths of occurrence of the preKungur subsalt deposits with respect to the seismic horizon  $\Pi_1$  were established by drilling. An analysis of the accuracy of the seismic constructions with respect to the  $\Pi_1$  horizon indicates that the errors in determining the depths of occurrence of the preKungur deposits within the boundaries of the eastern side of the basin are on the average about 300 meters, and in certain cases they increase to 800 meters (the Shubarkuduk and Nagornaya areas).

In addition, it has been established that on the structural level with respect to the  $\Pi_1$  horizon the surface of the preKungur deposits is not reflected. The analysis of the stratigraphic coordination of the  $\Pi_1$  reflecting horizon permits us to consider that the  $\Pi_1$  horizon only in individual cases can be connected with the erosion surface of the subsalt deposits. The physical stratigraphic coordination of the  $\Pi_{\text{boundary}}$  was not discovered. This boundary obviously is of different nature, in a number of cases it is connected with individual horizons of the lowermost strata of the Kungur, and in places it fixes the surface of the AVPD zone which is widely developed in the Caspian Basin and is noted above the foot of the Kungur series [2].

As a result of the application of improved reflected wave and common depth point procedures in recent years it has been possible to obtain reflections from the intrasubsalt boundaries fixed by the  $\Pi_2$  and  $\Pi_3$  horizons. Here the  $\Pi_2$  horizon has sporadic propagation. The stratigraphic association of the  $\Pi_2$  horizon also was not discovered. At the present time it is possible to

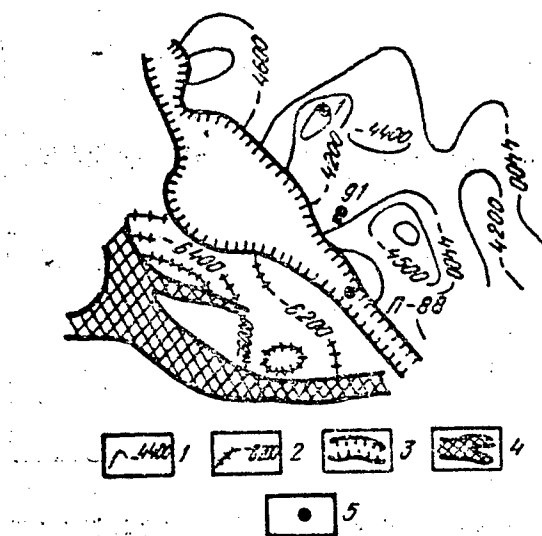


Figure 1. Structural map of the  $\Pi_2$  and  $\Pi_2^1$  horizons of the Bozoba-Kenkiyak Rayon:

1--isohypses with respect to the  $\Pi_2$  horizon; 2--isohypses with respect to the  $\Pi_2^1$  horizon; 3--zone of loss of correlation of  $\Pi_2$  horizon; 4--destruction zones; 5--wells.

propose equiprobably that the  $\Pi_2$  horizon is associated with the surface of the different aged (preVereysk) carbonates or the foot of the AVPD zone.

In the vicinity of the Kenkiyak and Bozoba structures when tracing the  $\Pi_2$  horizon, a broad submeridional zone of loss of correlation passing through the axial part of the Kenkiyak structure and the western wing of the Bozoba structure is noted. To the east and west of the indicated zone the  $\Pi_2$  horizon has different indexing. It is characterized by the various dynamic and kinematic attributes and it is fixed at essentially different depths.

To the east of the zone of loss of correlation the  $\Pi_2$  horizon is traced in which in the vicinity of the Kenkiyak dome, a local trough of 200 meters amplitude is noted. To the west of this zone the  $\Pi_2^1$  horizon is isolated which obviously lies approximately 1.2 to 1.5 km lower than the  $\Pi_2$  horizon (Figure 1).

The united structural constructions with respect to the  $\Pi_2$  and  $\Pi_2^1$  horizons for the entire investigated territory are impossible as a result of absence of the zones of joint tracing of these horizons.

The  $\Pi_3$  horizon obviously can be considered as a seismic landmark most suitable for decoding the internal structure of the subsoil deposits. Its co-ordination with the foot of the Carboniferous deposits or the roof of the terrogenic Devonian is the more probable. Therefore on introduction of the



subsalt structures to deep drilling, obviously it is expedient to be oriented not so much on the behavior of the  $\Pi_1$  horizon as on the nature of occurrence of the lower-lying intrasubsalt horizons, in particular, the  $\Pi_3$  horizon which more strictly reflects the structural plan of the entire subsalt series.

The investigation of the structure of the subsalt deposits of the eastern side of the Caspian Basin from the indicated points of view permitted isolation of a broad Bozoba Swell (see Figure 1) along the  $\Pi_3$  horizon having dimensions of 45 x 12 km extending meridionally and narrowing to the north. The axis of the swell undulates in the plan view and vertically. The highest position within the limits of the swell is occupied by the Bozoba-Kenkiyak uplift which with respect to the  $\Pi_3$  horizon is outlined by the minus 6400 meter isohypse. It has almost regular isometric configuration and dimensions of 15 x 15 km. The flat roof of the uplift is complicated by two peaks. The larger peak with respect to size with minimum marks of the  $\Pi_3$  horizon is minus 6050 meters, and it corresponds to the Bozoba local structure, and the smaller peak with minimum marks of the  $\Pi_3$  horizon of minus 6150 meters corresponds to the Kenkiyak local structure.

The Northern Bozoba and Baktytarynskoye uplifts located north of the Bozoba Swell and along its axis are characterized by smaller dimensions and greater depths of occurrence of the  $\Pi_3$  horizon.

South of the latitudinal Kenkiyak fault the subsalt reflecting horizon  $\Pi_3$  still has not been traced by the seismic studies using the reflected wave and common depth point methods. Judging by the behavior of the surface of the foundation traced along the series of regional profiles of the KMPV, south of the Kenkiyak Fault a submerged block is noted. This provides a basis for proposing further significant submersion of the  $\Pi_3$  horizon (by more than 400 meters) from the roof of the Bozoba-Kenkiyak uplift to the Kenkiyak Fault. Therefore the hypothetical ideas of certain researchers regarding the presence of a subsalt uplift south of Kenkiyak do not alter the conclusion of the possibility of isolation of the Bozoba-Kenkiyak uplift as an independent closed structure with respect to the  $\Pi$  horizon.

The Bozoba Swell on the whole and the Bozoba-Kenkiyak uplift are the most significant objects of this type along the  $\Pi_3$  horizon within the bounds of the entire east side of the Caspian Basin. These structures make up the eastern Caspian regional uplift of the foundation, to the west and east of which significant submersion of the surface of the foundation is noted [1], and the  $\Pi_3$  horizon submerges to the minus 7 to 7.5 km mark [4]. Thus, the regional tectonic position of the Bozoba-Kenkiyak uplift is exceptionally favorable for oil and gas accumulation (Figure 2).

The Kenkiyak Rayon has long attracted the attention of researchers in connection with the discovery of oil deposits here in the suprasalt and subsalt complexes. In parallel with the exploration work in the given area seismic studies have been made many times since 1959 by the reflected wave method and the controlled directional reception method, but the structure of the subsalt structure has not been discovered up to now.

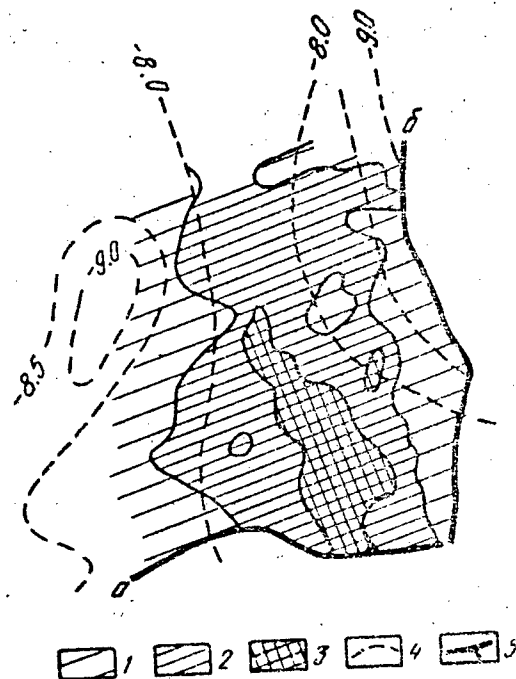


Figure 2. Schematic map of the structure of the Bozoba Swell along the  $\Pi_3$  horizon: 1-- region of occurrence of the  $\Pi_3$  horizon at depths below 7 km; 2--the same from 7 to 6.5 km; 3--the same above 6.5 km (the Bozoba Swell); 4--isohypses of the foundation surface; 5--tectonic disturbances: a--Kenkiyak; b--Ostansuk.

According to the data from the first seismic surveys (the reflected wave method in 1959 to 1960 and the controlled directional reception method in 1962), the subsalt Kenkiyak uplift was traced in the form of a sublatitudinal brachyanticlinal fold located under the salt dome with depths of occurrence of the subsalt reflecting horizon  $\Pi_1$  in the roof of negative 3000 to 3,200 meters. During subsequent drilling of wells  $\Pi$ -88,  $\Pi$ -89,  $\Gamma$ -90 and  $\Gamma$ -91 which opened up the subsalt deposits, significant errors were discovered in the seismic constructions both at the depths of occurrence of the roof of the subsalt deposits and in determining the morphology of the subsalt structure. The absence of the eastern wing between well  $\Pi$ -88 and  $\Pi$ -89 was established, and a steeper nature of the southern wing of the structure was discovered (between wells  $\Pi$ -88,  $\Gamma$ -90 and  $\Gamma$ -99).

Additional work by the reflected wave method with respect to two intersecting profiles and reinterpretation of the available seismic data considering the drilling data led to the conclusion that under the Kenkiyak salt dome the subsalt structure is absent, but two structural noses are noted (south of well  $\Pi$ -88 and  $\Pi$ -89) opening up to the south, in the direction of the Kokzhid sands [3]. This served as a basis for the widespread idea of the position of the roof of the subsalt Kenkiyak structure south of the salt dome.

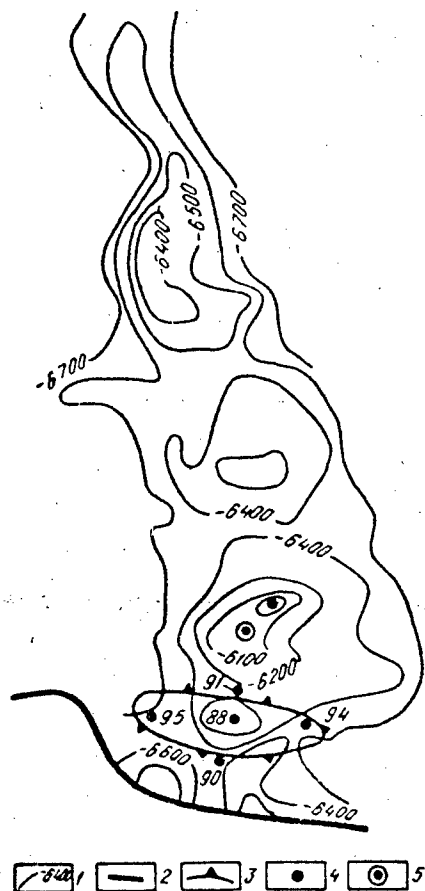


Figure 3. Structural map of the Bozoba Swell with respect to the  $\Pi_3$  horizon: 1--isohypses along the  $\Pi_3$  horizon; 2--tectonic disturbances; 3--steep bench of the Kenkiyak salt stock; wells: 4--drilled; 5--recommended.

Recently 14 wells revealing the subsalt deposits were drilled in the Kenkiyak area. The drilling data were used to construct the structural map of the roof of the subsalt preKungur deposits. The Kenkiyak structure was traced by these data in the form of the structural nose at depths of 3,550 to 3,650 meters opening up in the easterly direction. The highest position is occupied by the group of  $\Pi$ -88, 93 and 104 wells. To the west, the subsalt surface is sharply submerged to the minus 3780 meter mark to wells 92 to 98.

The territory located directly to the north of the Kenkiyak area where, according to the seismic exploration data, the Bozoba subsalt structure is isolated, deserves more attention. According to the available seismic data, the Bozoba structure is isolated along the  $\Pi_2$  horizon in the form of a structure along the fault at depths of 4,200 to 4,300 meters and with respect to the  $\Pi_3$  horizon in the form of a broad structure 200 to 300 meters in amplitude. With respect to the  $\Pi_1$  horizon the Bozoba is a sublatitudinal structural nose at depths of 3,600 to 3,700 meters. A comparison of the structural maps with respect to these horizons indicates that the thickness of the subsalt Paleozoic formations included between the seismic benchmarks

of  $\Pi_1$  and  $\Pi_2$  and also  $\Pi_2$  and  $\Pi_3$  obviously is reduced in the direction of the roof of the structure.

In the schematic of the thicknesses of the deposits between the  $\Pi_1$  and  $\Pi_3$  horizons it was demonstrated that the minimum thickness (2,300 meters) is associated with the roof of the Bozoba uplift, and a significant increase in the thickness to 2,800 meters is noted to the south, to the vicinity of the Kenkiyak salt dome and the Kenkiyak latitudinal fault. Thus, in the Bozoba region a large paleouplift is established the southern periclinal of which is the Kenkiyak. Let us propose that the structural plan of the entire series of subsalt deposits is strictly depicted by the nature of occurrence of the  $\Pi_3$  horizon. According to these data, well 91 located on the north wing of the Kenkiyak structure and giving oil from the 4,265 to 4,253 meter interval in the subsalt deposits is in the south wing of the Bozoba structure according to horizons  $\Pi_2$  and  $\Pi_3$  (see Figure 3). In well Г-1 drilled in the Bozoba structure, oil occurrences from a depth of 4,275 meters are noted.

The analysis performed according to S. S. Gatsloyeva on the materials on the surface of the AVPD zone indicates that in wells 91 and 88 this surface is located at certain depths, and then to the south it submerges significantly.

Thus, the available data permit the proposal of the presence in the Bozoba-Kenkiyak region of a united structure, obviously of ancient occurrence, the roof section of which is shifted along the  $\Pi_2$  and  $\Pi_3$  horizons to the north of Kenkiyak. Simultaneously with drilling it is also recommended that the common depth point method be used in the entire area of the Bozoba-Kenkiyak uplift. The observation and processing systems must provide for investigation of the lateral variability of the longitudinal wave velocity.

Considering the dimensions of the investigated uplift, the presence of numerous signs of oil and gas bearing nature of the subsalt section, it is possible to recommend drilling of a well 6,500 meters deep here in order to discover the Devonian terrigenous deposits, supposedly oil bearing.

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GAS CONDENSATES IN THE DEPOSITS OF THE PERM' KAMA REGION

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77 pp 15-17

[Article by N. N. Markov, T. I. Kolomeytseva, Yu. A. Satyukov, R. M. Kislovets, PermNIPIneft' Institute]

[Text] In recent years gas condensates were confirmed in a number of deposits (see the figure). In 1975 the industrial reserves of the condensate of the Kokuyskiy deposit were confirmed for the first time.

An analysis of the spread of the discovered deposits demonstrated that they are located predominantly in the territory of the Preurals trough and in the regions bounding on it. In the north, in the vicinity of the Solikamskaya Depression, the Gezhskiye and Tsepel'skiye deposits were discovered, and in the vicinity of the advance folds of the Urals, the Vetoskiye. In the south, in the vicinity of the Sylvenskaya depression, the Bukharovskoye and Kedrovskoye deposits were discovered. Condensate was obtained during the test from the parametric wells drilled in the Osintsevskaya and Vydryanskaya areas.

The stratigraphic range of the gas condensate distribution encompasses the Upper Devonian carbonaceous, the Lower Carboniferous terrigenous, the Middle Carboniferous and Lower Permian carbonaceous productive deposits.

The gas condensate is encountered in occurrences of various types of which with respect to thermodynamic phase state of the hydrocarbons can be divided into three groups.

1. The gas condensate occurrences with a petroleum margin of nonindustrial significance are considered as purely gas condensate with simple phase state of the hydrocarbons in the vapor phase.

The stratal roof deposit was discovered in the Kokuyskoye deposit in the carbonaceous beds of the Vereysk horizon (bed B<sub>3</sub>B<sub>4</sub>). The depth of occurrence was 1,200 meters, the stratal pressure was 112 kg-force/cm<sup>2</sup>, and the stratal temperature, 19°C.

#### Composition of the Raw Condensate (mole percent)

C <sub>1</sub> .....	44.66	hC <sub>4</sub> .....	4.22
C <sub>2</sub> .....	11.69	C <sub>5</sub> + higher .....	21.93
C <sub>3</sub> .....	14.83	CO <sub>2</sub> .....	0.06
C <sub>4</sub> .....	2.61		

#### Physicochemical Characteristics of the Condensate

Density, g/cm <sup>3</sup> .....	0.6648
Viscosity, centistokes .....	0.72
Sulfur content, % .....	0.0095
Beginning of boiling, °C.....	34
Boiled away to 110°C, % .....	80
Boiled away to 148°C, % .....	90
End of boiling, °C .....	186

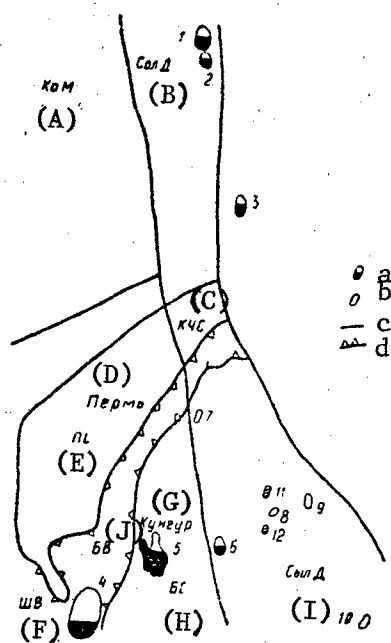
2. The gas condensate occurrences with the petroleum section of industrial significance (gas condensate caps).

The oil section has appreciably greater dimensions than the vapor phase. The stratal roof deposit was discovered in the roof of the carbonaceous deposits of the Bashkir stage in the Kokuyskoye deposit (the Bsh bed). The depth of occurrence was 1,236 meters, the stratal pressure was 133 kg-force/cm<sup>2</sup>, the stratal temperature, 20°C. The density of the oil under stratal conditions was 0.783 g/cm<sup>3</sup>, and the gas saturation was 128 m<sup>3</sup>/ton.

3. The oil and gas condensate deposits with single phase state of the hydrocarbon under stratal conditions.

The massive occurrences were discovered in the carbonaceous deposits of the Turneysko-Fransko-Famenskiy age in the Gezhskiy and Tsevel'skiy deposits. Light, light-colored oil was encountered here. The depth of occurrence of the roof was 1,970 meters, the stratal pressure was 228 kg-force/cm<sup>2</sup>, the stratal temperature was 29 to 33°C, the elevation of the deposit was more than 300 meters. The density of the petroleum under stratal conditions was 0.657 g/cm<sup>3</sup>, and the gas saturation was more than 400 m<sup>3</sup>/ton.

The studies establish that for significant depressions in the bed (to 180 kg-force/cm<sup>2</sup>) the wells gush oil. The delivery of the oil was up to 700 tons per day, the gas factor to 2,010 m<sup>3</sup>/ton. For the connections 5 to 12 mm in diameter the gas discharge reaches 17,100 to 52,100 m<sup>3</sup> per day. Here, at the mouth of the wells in the casing and the separator there is abundant fallout of raw condensate.



Distribution of the discovered gas condensate occurrences in the deposits of the Perm' Kama region:

Deposits a--oil and gas; 1--Gezhskoye, 2--Tsepel'skoye, 3--Vetosskoye, 4--Batyrbayskoye, 5--Kokuyskoye, 6--Brusyanskoye; b--gas; 7--Komarikhinskoye; 8--Kordonskoye, 9--Kedrovskoye, 10--Bukharovskoye; parametric drilling areas: 11--Vydryanskaya, 12--Osintsevskaya. Boundaries: c--first order structures; d--second order structures. The Kama-Kinel'sk system of basins; KaM--Kama monoclinical; PS--Perm' roof; BV--Babkinskaya depression; ShV--Shalym'skaya depression; BS--Bashkir roof; Sold--Solikamskaya depression; KChS--Kos'vinskoy-Chusovskaya saddle, SyLD--Sylvinskaya depression.

Key:	(A) KaM	(F) ShV
	(B) Sold	(G) Kungur
	(C) KChS	(H) BS
	(D) Perm'	(I) SyLD
	(E) PS	(J) BV

#### Properties of the Raw Condensate

Density, grams/cm <sup>3</sup>	0.7181
Viscosity, centistokes	0.72
Sulfur content, %	0.25
Beginning of boiling, °C	+ 37
Boils away, %:	
to 100°C	41
to 150°C	47
to 200°C	80
End of boiling	280



Gas Condensate Yield for Various Separation Regimes

Deposit	Age	Depth, meters	Gas pro- duction, thousands of m <sup>3</sup> /day	Separation conditions		condensate yield, cm <sup>3</sup> /m		Shrink- age co- efficient	Potential content, C <sub>5</sub> + higher, g/cm <sup>3</sup>
				pres- sure abs. atm.	tem- pera- ture °C	raw	stable		
Bukharovskoye	C <sub>3</sub>	2216	93	50	-10	12.2	9.5	0.78	17
Batyrbayskoye	C <sub>2</sub> pd	934	74	30	3	37.8	21.7	0.56	—
Kokuyskoye	C <sub>2</sub> ks+vr	988	100	40	-7	22.5	11.4	0.50	21.8
	C <sub>2</sub> vr	1122	137	40	-19	57	26.5	0.47	32.6
	C <sub>2</sub> b	1164	137	60	-12	49	22.5	0.44	—
			136	40	-16	35	16	0.46	—
			136	30	-18	49	23.5	0.48	34

The results of the industrial studies of the condensate yield (see the table) will permit the discovered deposits to be classified as low condensate, but in the vicinity of the trough the condensate yield is not studied and is expected to be high.

For stable condensate, a high yield of gasoline fractions is characteristic (greater than 80 percent). The density was 0.67 to 0.75 g/cm<sup>3</sup>, the viscosity was 0.5 to 0.9 centistokes, and the sulfur content was 0.03 to 0.25 percent.

With respect to group hydrocarbon composition the gasoline fractions of the condensate are methane type (greater than 50 percent by weight). The naphthene hydrocarbon content varies from 15 to 30 percent by weight.

For the Perm' deposits of the Kama Region, a general law was established which is expressed in a significant decrease in the density of the petroleum and an increase in their gas saturation in the direction of the Ural trough. In this regional direction, the methane content and the content of its homologs in the gases increase, the thickness of the sedimentary dome increases, the depth of occurrence of the gas condensate occurrences and the probability of their discovery during exploratory drilling increase.

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CHANNEL TYPE OIL, GAS DEPOSITS IN SOUTHERN MANGYSHLAK

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77 pp 17-21

[Article by Yu. K. Yuferov, K. Kh. Boranbayev, O. P. Korchin, A. Ye. Dmitriyev, the Mangyshlakneft' Association]

[Text] The deposits associated with the traps of the nonanticlinal type are a significant reserve for the exploitation of the oil and gas reserves in Mangyshlak. They can be connected with the zones of regional lithologic wedging out and stratigraphic mismatch, with erosion downcutting (paleo-valley and paleochannel), and with sections of local replacement of the collector beds by impermeable rock, and so on.

The significance of the paleorivers in the Middle Jurassic time in the territory of Southern Mangyshlak was first pointed out by V. I. Drugunov (1955) on the basis of studying the natural outcrops of the Beke-Bashkuduksk swell.

In 1968 V. S. Muromtsev and R. K. Petrova described a submerged channel of a Middle Jurassic river in the natural outcrops of one of the Sarymurun ravines (the Beke-Bashkuduksk swell).

As a result of detailed correlation of the sections of the wells in the productive horizon Yu-V (the Middle Jurassic, both) in the Uzen' deposit, in 1968 O. P. Korchin discovered two channel type bands of fine and medium grained sandstone to 55 meters thick which were formed on confluence of bands A, B and C. They extend from the northeast to the southwest through the basic roof of the Brachyanticlinal: the eastern band through wells Г-33, 250, 86 and the others to well Г-258, and the western band, through wells Г-488, 435 and the others to well Г-274. A characteristic feature of these sandy meandering bands is the asymmetric nature of the steepness of the banks along the channel which resembles a modern river with its steep and gently sloping banks.

In 1973, R. K. Petrova [3] demonstrated the general picture of the distribution of the sandy collectors of the Bayos stage in the deposits of the Zhetybay-Uzen' tectonic bench which were formed by the river flows within the limits of the alluvial delta lowland.

V. S. Melik-Pashayev approached most closely the solution of the problem [2]. As a result of the analysis of the basic indexes used to study the geological nonuniformity of the collector beds of the productive horizon Yu-I (XIII) of the Uzen' deposit, he constructed the maps of the sandstone propagation zones in the A-E bands and also the zones of the powerful monolithic sandstone formed on merging of these bands. The monolithic sandstones were propagated in the form of lenses or bands intersecting the Uzen' fold along the diagonal from northeast to southwest.

However, the separately used methods of investigation--the geophysical field (detailed correlation) and lithologic petrographic--could not give a true picture of the propagation of the sandstones or the paleogeographic conditions of the sediment accumulation in the territory of the Zhetybay-Uzen' tectonic bench.

In 1974 K. Kh. Boranbayev, applying the set of field-geological-geophysical and lithological-facies methods of investigation, for the first time isolated and traced in the Zhetybay-Uzen' tectonic bench the channel type sandy bodies of channel, delta genesis and lens sandstones of lacustrine-swamp origin in the deposits of the productive horizons Yu-IX (the Middle Jurassic, Bayos) and Yu-I (the Upper Jurassic, Calloway), confirming the previously stated propositions of the existence of an ancient river network in this area.

In the Bayos time the territory of Mangyshlak and Ustyurt experienced general submersion. The Southern Mangyshlak and Ustyurt syncline dropped most intensely where the thickness of the Bayos deposits reached more than 500 meters. The sediment accumulation at that time occurred under continental conditions of the lowland abounding in broad lakes, swamps and a dense river network. At the end of the century this lowland was converted to a coastal marine lowland periodically inundated by a shallow sea. All of this caused a complex structure of the Bayos deposit section, sharp lithological facies variability, and abundant species composition of the spores and pollen, numerous ancient carbonized plants, their root systems and the presence of autochthonic coals, the remains of fresh water and, rarely, marine fauna and also the appearance in the clays of swelling minerals of montmorillonite and mixed layered formations (O. P. Korchin, 1971, 1973).

The lower part of the Bayos stage where the Yu-X and Yu-IX productive horizons are isolated is especially inconstant in the lithologic and facies respects. Here not only the sharp lithologic variability is observed, but significant variation of the thickness as a result of frequent wedging out and replacement of certain lithologic differences by others at short distances.

The sandstones here, as a rule, are unidirectionally skew layered, and the clays are lumpy. The sandstones of the Yu-IX horizon up to 60 meters thick and permeable to 340 mD are associated with the sinuous channel type bands

from 250 to 1500 meters wide with a total (discovered) length of more than 100 km. The discovered bands clearly have asymmetric structure which is expressed in the variation of the steepness of the banks of the same channel.

On the average with respect to all the deposits of the Zhetybay-Uzen' bench, the content of fine and medium-grain sandstones in the channel bands reaches 60 percent or more. In the zones with periodic inflow of sandy material where the flood plain and oxbow lake deposits were developed, the sandstone content varies from 30 to 40 percent. For the sections where the lacustrine-swamp deposits developed the sandstone reaches 25 percent. This distribution of the sandy collector rack is a reflection of the directional nature of the paleoflows, forming the sediment in the Lower Bayos time. This is indicated by the results of 19 fractional analyses with the use of the R. Passeg genetic diagram.

In all, within the limits of the bench 22 channel bands were isolated, of which the two basic ones intersect the deposits more frequently in the sub-latitudinal (Uzen', Karamandybas, Asar, and so on), and sometimes in the submeridional (Zhetybay, Southern Zhetybay, and so on) direction. On the whole both bands form the powerful Uzen' paleoriver up to 8 to 10 km wide in its lower course with numerous large and small low, swampy islands separated by narrow and sinuous streams (see Figure 1). Within the limits of the Zhetybay, the Southern Zhetybay, Aktas and Tasbulat structures, the channel bands branch out in a fan shape and extend in the southwesterly direction toward Zhazgurlinskiy trough. They resemble the delta of a river with respect to outlines. Fourteen of the channel bands have been confirmed by numerous data, and 8 bands by the individual data from drilling exploratory and operating wells (K. Kh. Boranbayev, 1976).

The productive horizon Yu-I encompassing the formation of the Lower and Middle Calloway Substages is associated with the deposits of the Calloway Stage. The general submersion of the territories of Mangyshlak and Ustyurt continued in the Calloway Age. This caused the development of a transgression.

The investigated territory in the Lower and Middle Calloway time was a coastal marine lowland plain with numerous lakes, swamps and rivers. Periodically the water from the shallow Calloway Sea penetrated from the west to this plain. Finally this water flooded the territory of Southern Mangyshlak at the end of the Calloway. The terrigenous deposits of the Lower and Middle Calloway Age are characterized by sharp lithologic facies variability both with respect to area and with respect to section.

The studies of the deposits of the Yu-I horizon by the set of field-geological-geophysical and lithological-facies methods permitted discovery of the regular association of monolithic sandstones to 60 meters thick and with a



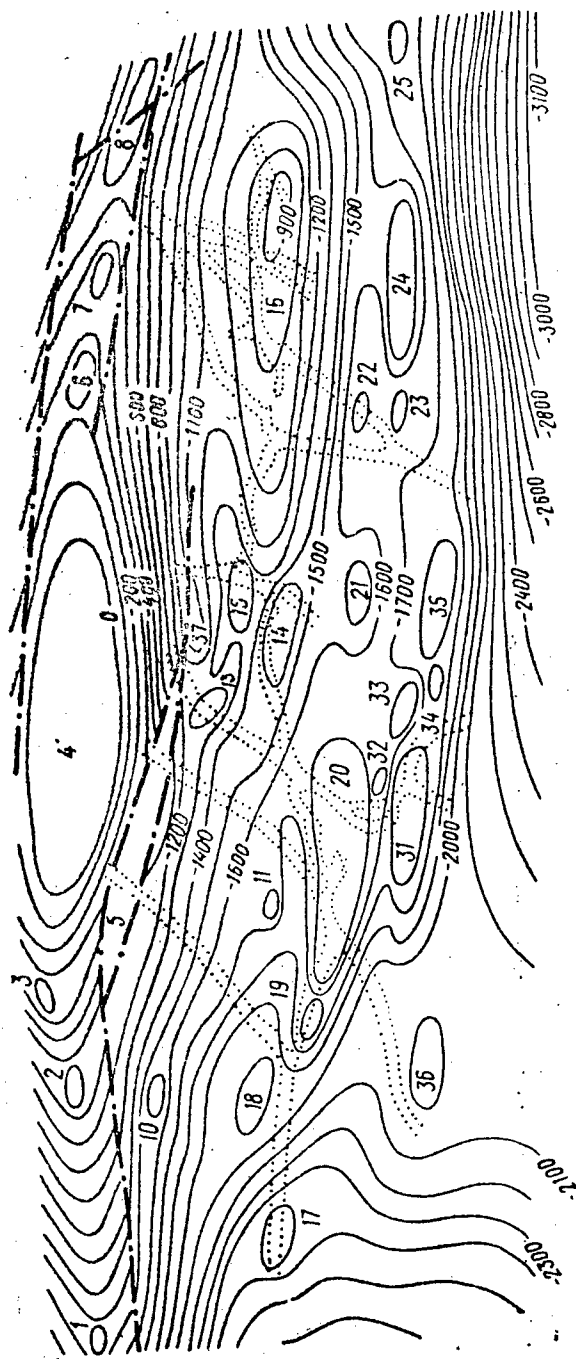


Figure 2. Schematic of the location of channel deposits of the Yu-1 horizon of the Zhetybay-Uzen' tectonic stage (Compiled by K. Kh. Boranbayev, 1973). Provisional notation the same as in Figure 1).

permeability to 3,800 mD to narrow winding channel bands. In the Zhetybay-Uzen' tectonic stage they are traced in a submeridional direction from the Beke-Bashkuduk swell, they intersect the Uzen', Asar, Turkmenoy, Eastern Zhetybay deposits, and so on (Figure 2), and they are made up of sandstones of channel genesis which is confirmed by the R. Passeg method. The sub-latitudinal discontinuous meandering band intersecting a number of deposits from east to west (Uzen', Karamandybas, Asar, Zhetybay, western and north-western Zhetybay, Karimin) probably are bar deposits which is indicated by the finds of marine fauna and the increase in grain size of the sandstone upward along the section. All of this indicates that at the end of the Middle Calloway within the confines of the stage there were deltas and fore-deltas of a paleoriver and also bars. In the section of the Yu-I horizon in the territory of this stage 17 bands of channel form were discovered, 11 of which were confirmed by numerous data, and 6 by individual data from drilling exploratory and operating wells (K. Kh. Boranbayev, 1976).

A characteristic feature of all of the deposits associated with the channel traps of channel, delta and other genesis are the constantly high oil production rates (on the average to 150 tons per day) with normal gas factors. The deposits associated with the lacustrine-swampy deposits are distinguished from the channel deposits by the very low (to 10 tons per day) oil production with sharply increased gas factors.

Thus, the existence of the channel deposits of oil and gas in the Bayos and Calloway deposits in all of the deposits of the Zhetybay-Uzen' tectonic stage has been proved, and the prospectiveness of finding the deposits controlled by the lithologic and structural-lithological factors has been confirmed (K. Kh. Boranbayev, 1974, 1976).

The analysis of the distribution of the thicknesses of the Jurassic deposits indicates their regular decrease to complete wedging out in the direction of the slopes of the large positive tectonic elements. Thus, on the north slope of the Karabogaz roof the Jurassic deposits completely wedge out, and within the limits of the Zhetybay-Uzen' tectonic stage a gradual decrease in thickness takes place to complete wedging out of the productive horizons (Yu-X, Yu-XI, Yu-XII, Yu-XIII) of middle and lower Jurassic age in the direction of the roof part of the Beke-Bashkuduk swell (see Figure 1) [1].

In the different sections of the stage the thickness gradients of the Yu-XIII horizon are different. Thus, in the vicinity of the Northwestern Zhetybay-Karamanata, it is on the average 11.6 m/km, the Zhetybay-Southern Karasyaz'-Taspas, 9.3 m/km, the Asar-Turkmenoy-Taspas, 15.2 m/km, and the Uzen'-Sokko, 9.4 m/km. This nonuniform variation of the thickness gradient indicates the complex and sharply intersected relief of the preJurassic and Lower Jurassic deposits (see the table). In addition, the productive horizons Yu-X, Yu-XI, Yu-XII, Yu-XIII are located significantly below the boundaries of the zones of regional lithological wedging out and stratigraphic mismatch of the collector beds of the same age, which causes a stratal pressure gradient. For example, the average height and stratal pressure gradient in the synchronous collector beds of the productive horizon Yu-XI in the Northwestern Zhetybay-Karamanata region is approximately 1240 meters and 174 kg-force/cm<sup>2</sup>, for Zhetybay-Karasyaz'-Taspas it



Section between Beke-Bashkudukskiy swell and structure	Average magnitude of the thickness gradient of the productive horizons m/km	Average magnitude of the height gradient of the synchronous pro- ductive beds and stratal pressures m/technical atmospheres									
		Yu-XIII	Yu-XII	Yu-XI	Yu-X	Yu-I	Yu-XIII	Yu-XII	Yu-XI	Yu-X	Yu-I
Northwestern Zhetybay	11.6	11.7	4.3	8.0	4.3	450	975	1738	1538		
						4.5	9.75	173.8	153.8		
Zhetybay	9.3	7.0	3.3	5.4	1.4	270	734	1580	1690	1560	
						2.7	7.34	158.0	169.0	156.0	
Asar-Turkmenoy	15.2	15.0	5.7	8.0	2.0	365	607	1368	1415		
						3.65	6.07	136.8	141.5		
Uzen'	9.4	15.0	4.4	8.8	1.0	220	130	1030	930		
						4.4	1.3	103.0	93.0		

is 1580 m and 158 kg-force/cm<sup>2</sup>, for Asar-Turkmenoy-Taspas, 1370 meters and 137 kg-force/cm<sup>2</sup>, Uzen'-Sokko, 1030 meters and 103 kg-force/cm<sup>2</sup> (see the table).

In the territory of the Zhetybay-Uzen' tectonic bench during the Lower Jurassic to Middle Cretaceous time, first continental and then coastal marine situations of sediment accumulation existed. They caused a sharp lithologic and facies change in the productive horizons and predetermined the formation of the sand collectors in the channels, deltas and foredeltas of the paleorivers, in the paleolakes, the shore bars, and so on. Therefore, the channel and lithologic traps in Mangyshlak and Ustyurt are the rule and not the exception. During the further development of this region, the necessary prerequisites were created for the formation and the conservation of the oil and gas beds of different genesis. This was promoted by favorably tectonic conditions (inherited development of the region during the course of almost the entire Mesozoic time). The migration of the liquid and gas hydrocarbons from the axial parts of the Segendybskiy and the Zhazgurlinskiy troughs took place in the direction of their lateral zones and, in particular, the Zhetybay-Uzen' oil and gas accumulation zone. The filling of the traps already existing at that time occurred independently of their genesis (O. P. Korchin, 1969, 1973).

The gas and oil occurrences discovered within the limits of the bench are controlled not only by the structural but also the lithologic factors; therefore it is necessary theoretically to change the procedure for finding and exploring new deposits and also the procedure for exploitation of the discovered deposits. For this purpose, in the exploratory stage the known methods and procedures must be combined with the paleogeographic and the direct geophysical methods of investigation. This will permit more purposeful placement of the exploratory wells and their profiles under the most favorable geological conditions, a reduction in volume of the exploration drilling to the optimal value and also an increase in the probability of the discovery of occurrences of the structural lithologic and nonanticlinal type.

In the Zhetybay-Uzen' tectonic bench it is possible to isolate a number of objects and determine the order of the performance of the exploration work in them in order to discover the occurrences of the nonanticlinal and combined type. These objects are the following:

1. The zone located between the Uzen'-Northwestern Zhetybay deposit and the regional deep faults on the west slope of the Beke-Bashkudukskiy swell and also its roof section (see Figures 1, 2). The prospectiveness of this zone is connected with the discovery in it of the limits of the Burmash deposit.
2. The vicinity of the Bol'shaya Mangyshlak flexure where the prospectiveness of finding oil and gas occurrences is indicated by anomalies of the deposit type detected by direct geophysical methods.
3. The sections located between the brachyanticlinals where the channel type bands of monolithic sandstones were traced.
4. The eastern part of the Zhetybay-Uzen' stage where the Kulandinskaya and the western Kulandinskaya folds were discovered. The prospectiveness of this section was indicated by the gas shows in the Komsomol'skaya area of the Kokumbayskaya monoclinel where the anomalies of the deposit type were detected.

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NONUNIFORMITY OF DEPOSITS OF FRANSKIY STAGE OF VISHANSK DEPOSIT

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77 pp 21-23

[Article by A. N. Berezayev, R. A. Danilin, M. F. Kibash, Belorusneft' Association]

[Text] The nonuniformity of the bed is one of the basic peculiarities of the collector influencing the conditions of development, the nature of flooding of the wells, especially under the conditions of the effects of water pumped into the productive horizons.

The Vishanskoye oil-bearing deposit is associated with the west end of the Rechitsko-Vishanskaya zone of the uplifts of the Pripyatsk trough. The carbonaceous deposits of the subsalt complex of the Devonian and the Voronezh, the Semilukskiy and Sargayevskiy horizons are industrial oil bearing formations here.

The detailed lithologic and petrographic studies demonstrated that the productive deposits are represented basically by secondary dolomites. In the Semiluksko-Buregskoye time under the conditions of the weakly salty shallow sea basin the reef builders (Bryozoa, sponges, sometimes corals) created organogenic structures, biostroma.

In the platform stage of development of the Prypatsk trough against a background of penepalized bottom of the sedimentary basin uplifted sections existed where reef-building organisms could inhabit and develop. In the zone of increased hydrodynamic activity, the organogenic material was subjected to intense wave action and degradation, and the zones of deposits with improved collector properties were formed. On the slopes where the hydrodynamic activity of the water fell off, deposits formed with worse collector properties.

The studies established the high degree of jointing of the productive deposits, the specific attribute of the nonuniformity of the carbonaceous collectors. It is interesting that the cracks are traced in various lithologic differences (secondary and syngenetic dolomites, organogenic and

chemogenic limestones, marls), which makes an impression on the morphology of the crack walls. Thus, the dolomites and the organogenic limestones form nodular, uneven surfaces, and in the chemogenic and thin layered argillaceous limestones cracks predominate with even wall surfaces. It is characteristic that the number of parallel vertical cracks in the oil containing rock does not depend on the distance to the regional fault, but in the fault zone the number of mineral cracks increases sharply.

The deposits of the Voronezh horizon were represented by dense fine-grained secondary dolomites, more rarely sedimentary dolomites, for which the level surface of the crack walls is characteristic. These cracks react well to the created depressions. The Semilukskiy horizon made up of secondary dolomites is distinguished by the hilly, uneven surface of the walls of the open joints. This prevents linking of the joints, and the joints themselves can play the role of connecting pipes creating hydraulic drags along the path of movement of the stratal fluids.

The joints of the Sargayevskiy horizon have even wall surfaces. Frequently they are healed with the acid components of the oil (asphaltenes, resins) and salts; therefore they are not conducting systems. An analysis of the jointing by the procedure of [1, 2] permitted isolation of three directions of the joint development in the area with orientation of the joints to the northwest at an angle of 310 to 340 and from 280 to 290° and to the south-east 100 to 110°. The directions of the joints in the Voronezh, Semilukskiy and Sargayev deposits coincide.

Coefficients of the Geological Nonuniformity of the Carbonaceous Collectors of the Vishansk Deposit Table 1

Horizon	$K_p$	$K_r$	$K_l$	$P_s$	$K_{r.m}$
Voronezh	0.48	4.95	0.10	0.47	--
Semilukskiy	0.63	2.73	0.00	0.68	0.22
Sargayevskiy	0.39	4.13	0.30	--	--

The nonuniformity of the strata can be estimated by a number of indexes depicting the peculiarities of the geological structure of the deposits. For the productive horizons of the Vishansk deposit, a high degree of nonuniformity is characteristic (see Table 1). The Voronezh deposits are characterized by high dismembering ( $K_p = 4.95$ ) whereas the Semilukskiy horizon is more sustained and uniform ( $K_p = 3.0$ ). The maps of the propagation of the number of interlayers of the collector constructed by the procedure of O. P. Obukhov (1964) indicate that the central and the roof sections of the structure where an increase in the effective thickness takes place corresponds to greater dismemberment of the productive section.

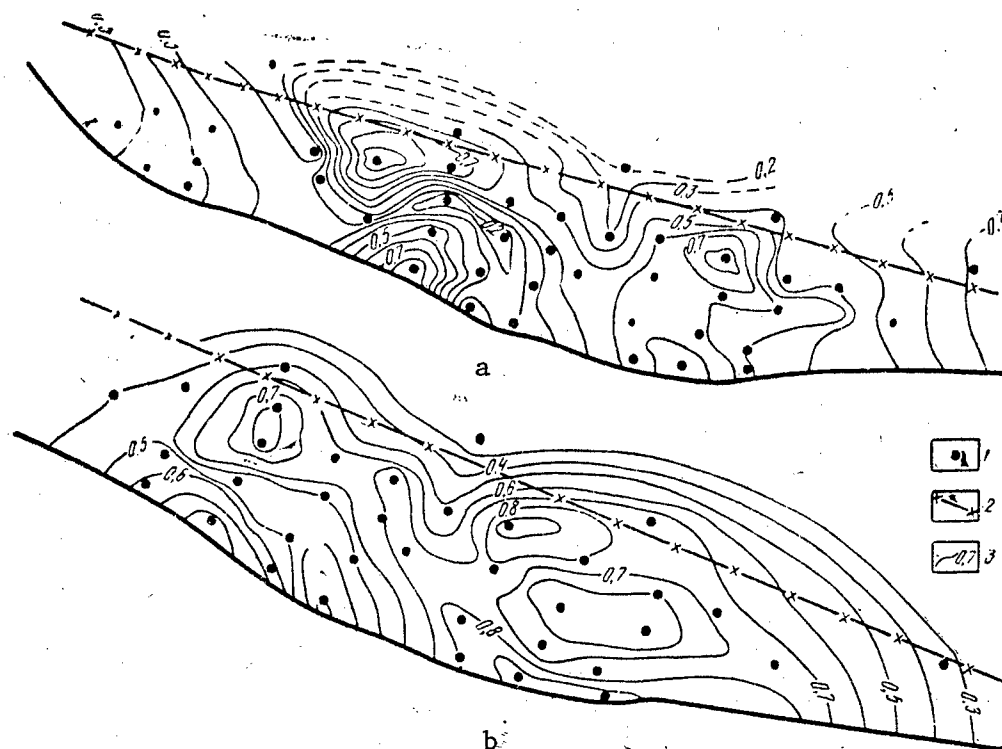
In the submersion zones the effective thickness decreases, and the interlayers of the collector wedge out or are replaced.

The coefficient of the proportion of the section of the collectors ( $K_h$ ) in the total thickness (the ratio of the effective thickness to the total thickness of the horizon) for the Semilukskaya deposit is 0.63; for the Voronezh horizon, 0.48. The total nature of the propagation with respect to area of the coefficient of the proportion of participation of the collectors for the Voronezh and Semilukskaya horizons is depicted in the figure. The maximum values of the coefficient  $K_h$  in plan view correspond to the central uplifted sections of the structure. It decreases in the direction of submersion. Here, on the outline of the oilbearing beds, between the pumping zone and the zone of occurrence, a sharp decrease in the effective thickness takes place. The coefficient of coupling of the zones outside and inside the outline with respect to effective thickness ( $\Pi_c$ ) is the ratio of the sum of the products of the effective thickness times the porosity of the streaks correlated with the streaks of the zones inside the outline, to the sum of the products of all of the streaks of the zone inside the outline times their porosity. For the Voronezh horizon it is 0.47, and for the Semilukskiy, 0.68. When comparing the possible final petroleum recovery and the pressure gradient between the sampling zone and the pumping line with the coupling coefficient it is obvious that there is a quite close relation between these values. Thus, for the Semilukskaya horizon of the Rechitskoye deposit the calculated coefficient is 0.70, and the pressure gradient reaches 35 kg-force/cm<sup>2</sup> for a coupling coefficient of the zones outside and inside the outlines of 0.91. For the Semilukskiy horizon of the Vishansk deposit the coupling coefficient is less ( $\Pi_c = 0.68$ ), which leads to an increase in the pressure gradients to 120 kg-force/cm<sup>2</sup> with a petroleum recovery coefficient of about 0.4. From this it follows that the sustaining of the stratal pressure by pumping water into the sections near the outline is more efficient for the Semilukskaya occurrence of the Rechitskoye deposit.

The wedging out coefficient ( $K_A$ ) indicating the proportion of the thickness of the wedging out collector interlayers as a function of the effective thickness is equal to 0.10, 0.00, 0.30 for the Voronezh, Semilukskaya and Sargayevskiy horizons respectively. The Semilukskaya horizon is monolithic, uniform. The collector interlayers correlate well and are connected to each other.

In order to study the layered nonuniformity and determine the potential reserves of the bed it is possible to use the coefficient of operating thickness ( $K_{p.m}$ ) which is the ratio of the operating thickness to the discovered effective thickness. For the Vishansk deposit (Table 2)  $K_{p.m}$  is on the average 0.22.

The maximum values of  $K_{p.m}$  are observed in the zone of pumping wells, and the minimum values, in the sections of the deposit next to the outlines.



Vishansk deposit. Schematic maps of the distribution of the coefficient of proportion of participation of the collectors: a--Voronezh horizon; b--Semi-lukskiy horizon; 1--wells, 2--tectonic disturbance; 3--isolines of the coefficient of proportion of participation of the collectors.

Table 2

Values of the Coefficients of the Operating Thickness Reduced to the Perforated Thickness

Well No.	Thickness, meters			Coefficient of operating thickness $K_{p'm}$
	effective	perforated	operating	
2	47,2	60,0	2,0	0,042
3	49,4	50,0	8,0	0,16
5	52,4	17,0	5,0	0,095
33	48,0	96,0	12,0	0,25
26	32,4	66,0	6,0	0,19
34	35,9	67,0	7,0	0,20
36	31,9	68,0	17,0	0,53
37	14,0	172,0	10,0	0,56
32	13,7	90,0	2,0	0,14

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UDC 550.834(470.43)

TRACING MICROGRABENS IN THE KUYBYSHEV REGION OF THE VOLGA

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77.  
pp 24-26

[Article by A. F. Sokolov, B. T. Bolotnikov, M. D. Malykhin, O. V. Makhanev, Kuybyshevneftegeofizika Trust]

[Text] The structures controlled by the varied Devonian micrograbens are a reserve for increasing the oil and gas reserves in the Kuybyshev Zavolzh'ye (Volga Region).

The search for the micrograbens in the southeastern part of the Russian Platform is being conducted by a set of methods made up of seismic exploration by the common depth point method and deep drilling. This procedure led to the discovery of a large number of deposits in the oil-bearing zones controlled by the Devonian micrograbens in the Bashkir ASSR [2].

The Bashkir geophysicists have proposed the presence of micrograbens in the Orenburg and Kuybyshev oblasts.

Previously, in the territory of the Kuybyshev oblast it was not possible by seismic methods to detect the disjunctive disturbances of the type of micrograbens, by the results of the reflected wave method only the disjunctive disturbances of the fault type were noted [1].

In recent years the seismic exploratory work in the territory of the Kuybyshev oblast has been conducted by the common depth point method with the application of a complicated method of processing the seismic data on a computer. Seismic exploratory work was performed within the boundaries of the Stavropol' depression by the standard reflected wave methods using the system providing for single continuous tracing. The low efficiency of this work is connected with the fact that the area is characterized by the presence of exceptionally intense multiple reflected waves (see Figure 1), the interference of which with the useful reflections complicates their correlation or makes it in practice impossible.

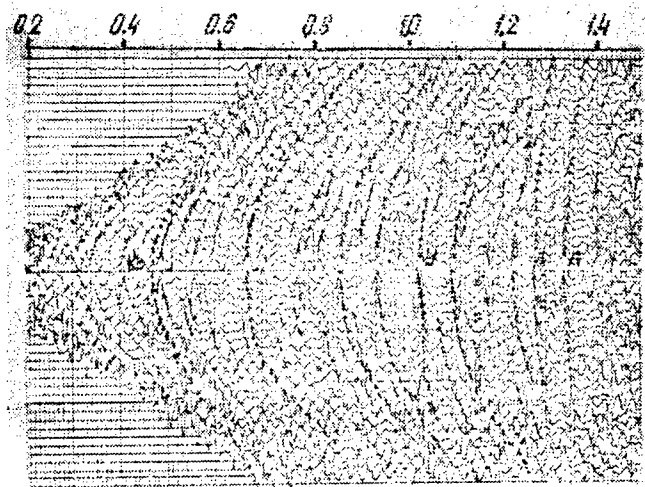


Figure 1. Seismograms illustrating the superposition of multiple waves on reflected waves.

The constructions using the data from the reflected wave method with single overlap were of a schematic nature. The deep tectonics of the area remained uninvestigated.

Since 1973 seismic studies have been made in the Stavropol' depression by the common depth point method. As is known, this method is an effective means of controlling multiple waves. The optimal schematic of the field observations turned out to be the twelvefold symmetric system with maximum spacing of the explosion device of 1,125 meters; the displacement step was 100 meters, the distance between centers of groups of seismic receivers was 50 meters. The selected  $X_{\max} = 1,125$  meters was calculated from maximum attenuation of the multiple waves, but it did not exceed the distance at which the wave is reflected from the horizon Y (the Bobrikovskiy horizon of the Lower Carboniferous) interferes with the direct and transcritical waves.

In order to suppress the low and medium speed and random interference, a linear grouping of 7 seismic receivers was used with triangular distribution of the sensitivity, and the grouping of explosives from three sources was used.

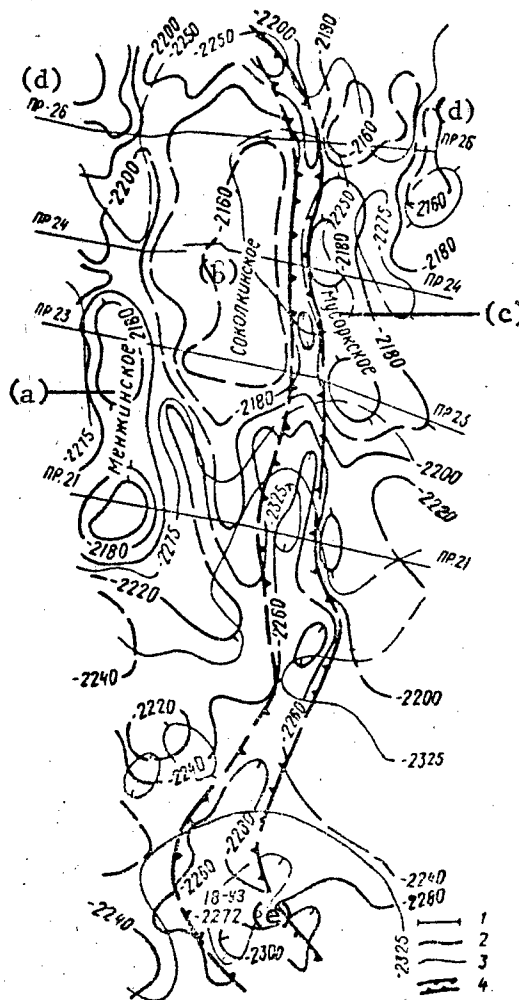
In all of the seismograms the recorded wave field was characterized by the presence of intense multiple waves which essentially complicate the isolation of the useful reflections of Kz, V, U and D. As a result of the processing of the materials from the common depth point method, time sections were obtained of basically good quality. The reflecting horizons of the Kz, V, U and D are traced reliably on them. The reflecting horizon A is impossible to trace continuously which obviously is connected with its complex structure.

In a number of time sections (profiles 13, 24, 26 and others in the Shipovskaya and Borkovskaya areas), the disjunctive disturbances of the type of the micrograbens are isolated with respect to the reflecting horizons D and A. As is known [2], the characteristic features of the micrograbens are the following: the steplike behavior of the reflecting horizons D and A, the presence of diffracted waves, a loop, the variation in shape of the recording, the increase in the time interval between the reflecting horizons U and D, and the presence of a trough through the leaching out horizons U and V.

Figure 2. Fragment of the structural map with respect to the reflecting horizon D:

- 1--seismic profiles of the common depth point method
- 2--stratohypses of the reflecting horizon D by the data of the common depth point method;
- 3--stratohypses of the reflecting horizon D according to the reflected wave method data;
- 4--micrograben outlines.

Key: (a) Menzhinskoye  
(b) Sokolkinskoye  
(c) Musorskoye  
(d) PR  
(e) UZ



All of these signs are clearly expressed in the time sections. The time interval between the U and D reflecting horizons increases as a result of an increase in the thickness of the Kynovskoye deposits ( $Dz^{kn}$ ) which is one of the basic direct signs of the presence of a micrograben [2]. Within the limits of the isolated micrograben there is a deep exploratory well (well 18-UZ) which reveals the Kynovskoye deposits of increased thickness (see Figure 2). Thus, the presence of a micrograben is proved both by the data from seismic exploration by the common depth point method and the results of deep exploratory drilling. In order to simplify the wave picture

obtained in the time sections of the common depth point, conversion by the TsGE program "Dynamic Conversion of the Time Section to a Time Section Considering the Weighting Coefficients" was used.

The sections of the disjunctive disturbances in the time sections of the common depth point after dynamic conversion are characterized by a simplified wave picture as a result of which the reliability of the correlation is improved. In addition, in order to establish the parts of the geological structure, the set of processing procedures was used made up of the inverse filtration of the time section by the ADF program developed by the VO IG and the RGI Institutes and subsequent dynamic conversion. This procedure permits us to obtain the best quality of time sections inasmuch as along with the simplified wave picture the resolvability of the seismic recording increases.

As a result of the studies, the structural map was constructed with respect to the reflecting horizon D (See Figure 2). A narrow graben like trough was traced on it which extends from north to south a distance of 25 km.

The width of the trough varies from 0.7 to 2 km. Its depth reaches 50 meters. The given trough was not detected previously by the single overlap reflected wave method efforts. At the present time a number of uplifts controlled by this graben have been discovered which were not found previously by the reflected wave method (see Figure 2).

The presented data indicate the prospectiveness of using seismic exploration by the common depth point method for finding the graben troughs in the Kuybyshev Zavolzh'ye. The effectiveness of the exploration will improve when using the latest achievements in the field of digital processing, in particular, such procedures as inverse filtration and dynamic conversion.

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RELATION OF NATURAL RADIOACTIVITY TO THE CLAY NATURE OF ROCK

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 77  
pp 32-34

[Article by D. M. Srebrodol'skiy, G. P. Matchinova, VNIYAGG Institute]

[Text] During the exploration and exploitation of oil and gas deposits the methods of natural radioactivity have great practical application. The basic advantage of gamma logging when investigating the sections of oil and gas deposits is the possibility of the quantitative analyses of the clay nature of the rock by the data from this method.

The close dependence of the radioactivity of sedimentary rock on the clay content predetermines the relation of this parameter to the collector properties of the rock. The role of the clay content in the formation of the collector properties of the sand and clay complex of rock is generally known. The content of clay material determines the capacitive and the filtration properties of the terrigenous deposits (porosity, permeability, bound water content, and so on). The data on the natural radioactivity in the complex with other materials of field geophysics can be used for evaluation of these properties.

The studies to discover the dependence of the general radioactivity of sand-clay and carbonaceous rock or the gamma log readings on their clayeyness were made by L. S. Polak, N. A. Per'kov, V. N. Dakhnov, A. V. Zolotov, V. V. Larionov, et al. V. V. Larionov (1969) proposed a procedure for determining the clayeyness by the gamma logging data.

The studies were performed in wells and on rock samples of various oil and gas bearing basins without considering the sedimentation conditions and the mineral composition of the deposits. Therefore the possibilities of studying the relation of the natural radioactivity to the clayeyness were not completely discovered. As a result of absence of the physical substantiation of the nonlinearity of the nature of the dependence of the gamma log readings on the clayeyness, some researchers have doubted the fact of this nonlinearity [3].

In recent years it was established [1, 2, 4] that the curves for the general radioactivity as a function of clayeyness of terrigenous and carbonaceous deposits of the oil and gas deposits are always nonlinear, they can occupy different position with respect to the x and y axis and have different form (more filled out or in rare cases close to rectilinear nature). The relation of the gamma log readings or general radioactivity to the clayeyness can be disturbed, which for a defined basin or stratigraphic complex of deposits depends on the relation of each radioactive element to the clayeyness, the proportions of radiation of the radioactive elements in the general gamma radiation of the rock and the mineral composition of the deposits.

Let us consider the relation of the radioactive elements and the total radioactivity of the rock samples to the clayeyness in the example of terrigenous polymictic deposit of the Lower Red [Colorado?] of Southwestern Turkmenia, the Albian and Neocomian of Southeastern Turkmenia and the Jurassic deposits of Uzen' and Zhetybay in Southern Mangyshlak (see the figure). For the sandy aleurolite rock of these deposits a polymictic composition is characteristic distinguished by the presence of a large number of minerals with different percentage content in each stratigraphic complex of the deposits. Along with quartz and minerals of the micagroup (biotite, muskovite and chlorite) there are feldspars represented by potassium (orthoclase, microcline) and sodium minerals (plagioclase). Many of these minerals are characterized by an increased potassium content (see Table 1).

Table 1

Potassium Content in the Basic Rock Forming Minerals

Minerals	Potassium Content %	Minerals	Potassium Content %
Quartz	0.07	Mica:	
Feldspars		biotype	8.25
Orthoclase	11.80	muskovite	9.32
microcline	10.90	flagocite	8.66
plagioclase	0.54	lepidolite	8.04

The high thorium content in the sand and aleurolite rock is also connected with the mineral composition. The sandstones of the investigated deposits are rich in accessory minerals, zircon, garnet, tourmaline, rutile, magnetites and hornblende which are the basic concentrators of thorium (see Table 2).

Table 2

## Thorium Content in the Accessory and Rock Forming Minerals

Minerals	Th x 10 <sup>-4</sup> content %	Minerals	Th x 10 <sup>-4</sup> content %
Quartz	4.5	Magnetite	53.0
Potassium feldspar	7 to 12.0	Garnet	16.0
Biotite	30.0	Zircon	45.0
Hornblende	32.0		

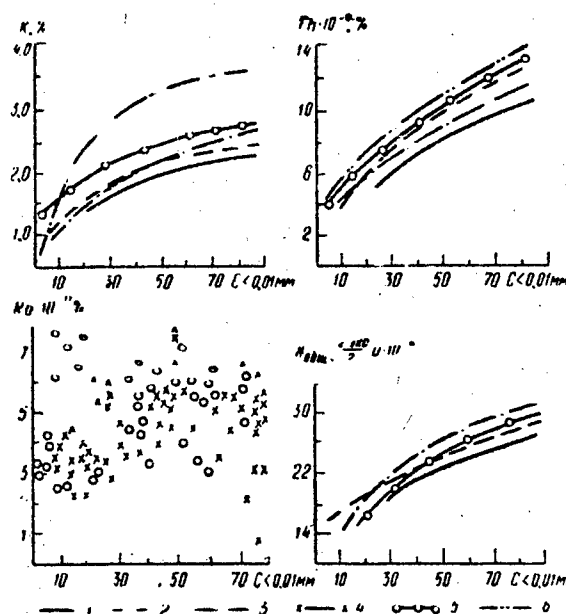
The polymictic sand-aleurolite rock are combined with polymictic clays. In the clay faction the clayey minerals montmorillonite and hydromica predominate. Chloride and vermiculite are also present. The composition of the clay in the Neocomian deposits of Southeastern Turkmenia is predominantly hydromica. In the Albian deposits of Southeastern Turkmenia, the Lower Colorado of Southwestern Turkmenia and the Jurassic deposits of Southern Mangyshlak the clay composition is hydromica montmorillonite with different percentages of hydromica and montmorillonite present. The clayey minerals contain a smaller amount of potassium by comparison with the feldspars and micas found in the sand-montmorillonite fraction of the rock (See Table 3).

Let us proceed to an investigation of the functions presented in the figure. A comparison of the amount of potassium, thorium and radium with a content of the fraction smaller than 0.01 mm in the rock of different oil and gas-bearing basins and the stratigraphic complexes of the deposits of different mineral composition demonstrated that the clearest relation exists between the potassium, thorium and clay content. There is no relation between the radium and the clay content.

Table 3

K<sub>2</sub>O Content in Argillaceous Minerals

Argillaceous Minerals of Groups	K <sub>2</sub> O, %
Kaolinite	0.12--0.58
Montmorillonite	0.01--1.59
Hydromica	5.10--9.12
Chlorite	0.08--0.17
Glaucanite	6.02--7.51



Relation of Radioactive Elements and Total Radioactivity to the Clay Content ( $C$  less than 0.01 mm) for the Deposits of Southern Mangyshlak, Southeastern and Southwestern Turkmenia:

1--Apsheron of Southwestern Turkmenia; 2--Nebit-Dag Suite of the Lower Colorado of Southwestern Turkmenia; 3--Kotur-Tepinskiaya Suite of the Lower Colorado of the Southwestern Turkmenia; 4--Jurassic deposits Uzen', Zhetybay; 5--Albian of Southeastern Turkmenia; 6--Neocomian of Southeastern Turkmenia.

The curves for the functions  $C_K = f(C_{<0.01})$  and  $C_{Th} = f(C_{<0.01})$  have a different shape: for potassium they are curvilinear (more gently sloping or rising steeply upward depending on the mineral composition of the deposits); with respect to thorium for all rock complexes they are almost rectilinear. The difference in shape of the curves for the functions  $C_K = f(C_{<0.01})$  and  $C_{Th} = f(C_{<0.01})$  is caused by the different forms of finding the elements [1, 2]. The presence of a close correlation between the thorium content and the  $< 0.01$  mm fraction in the rock quite uniquely indicates that the sorbed form of the thorium find predominates in the clay. The presence of the accessory minerals insures high thorium content in the sand-aleurolite rock (see Table 2); therefore the curves are shifted significantly along the x-axis (they take up a different position with respect to the x-axis depending on the amount of accessory minerals in each stratigraphic complex of the rock). An increase in the amount of clay material causes a proportional increase in the thorium content in the rock, and the function  $C_{Th} = f(C_{<0.01})$  is almost of a rectilinear nature.



Theoretically the potassium is distributed differently in the rock. It is part of the crystal lattice of all of the potassium containing minerals. This form of finding the potassium is predominate. The high potassium content in the feldspars and the micas (See Table 1) and their association with the largest fractions insured high concentration in the sand-aleurolite rock. This led to a steep rise in the curves for the function  $C_K = f(C_{<0.01})$  upward into the low clay content region (20 to 30 percent of the <0.01 mm fraction). For higher contents of the <0.01 mm fraction in the region of the clay-aleurolite and clay rock a significant role begins to be played by the potassium of the argillaceous minerals. Since they contain less potassium (see Table 3), the increase in the clay content leads to relatively less sharp increase in the potassium content. The curves on the graph are fitted out. This is especially characteristic of the Lower Colorado of Southwestern Turkmenia, and Albian of Southeastern Turkmenia and the Jurassic deposits of Southern Mangyshlak where mixed layered clays of hydromicamontmorillonite composition are developed. In the case of development of predominantly hydromica clays (the Neocomian of Southeastern Turkmenia) containing more potassium, the curve rises sharply upward into the region of higher contents of the < 0.01 mm fraction. Consequently, the nature of the function  $C_K = f(C_{<0.01})$  is determined primarily by the mineral composition of the sand-aleurolite and argillaceous rock.

Thus, independently of the age of the deposits and the sedimentation basin the forms of the curves  $C_{Th} = f(C_{<0.01})$  and  $C_K = f(C_{<0.01})$  are different, the nature of them is completely determined by the mineral composition of the rock. It becomes obvious that all of the traces of the shape of the curves for the relation of the total radioactivity to the clay content had no physical basis. For greater potassium contribution to the total gamma radiation of the rock, the curves for the total radioactivity as a function of the clay content will be fitted out or rise steeply upward depending on the mineral composition of the deposits. For greater contribution of the thorium, the function will have close to rectilinear nature; for higher contribution of uranium (radium), the dependence of the total radioactivity on the clay content will be disturbed.

For certain analysis of the results of the gamma logging in order to determine the argillaceous material content in the sections and to construct the nomograms for the quantitative estimation of the clay content, well gamma spectrometric measurements in each oil and gas basin and stratigraphic complex of the deposits are required.

The quantitative determination of the clay content of the collectors has great practical significance. Combined with the other materials of field geophysics, the clay content parameter is used in the oil and gas deposits for lithologic dismemberment, correlation, isolation of the permeable differences, quantitative evaluation of the collector properties and the coefficient of oil and gas saturation of the rock.

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## MANPOWER

### PROPER UTILIZATION OF SPECIALISTS

Moscow LITERATURNAYA GAZETA in Russian 23 Nov 77 p 13

[Article by N. Panferova, head of the Statistics of Culture Division of the USSR Central Statistical Administration: "So Then: Is There a Surplus or a Shortage?"]

[Text] (As we see, a series of comments which have arrived in our editorial offices pose the question: Is not the output of our higher schools too great, and isn't it leading to a surplus of graduate specialists, with the result that work simply will not be found for them in their specialty? We turned to the USSR Central Statistical Administration with a request for clarification of this matter. The commentary received by our editorial offices is printed below.)

Before everything else, the manner in which this question is put--and here I have in mind the talk about some surplus of specialists--strikes me as being fundamentally incorrect. Knowledge is an enormous resource. The more broadly educated, knowledgeable people there are in a country, the more society as a whole is able to fulfill complex, large-scale tasks.

It is known that a nation such as the United States, which is developed in the industrial sense, is constantly preoccupied with enticing specialists from Europe and even from the developing countries, despite the presence there of a rather widespread network of educational institutions. The Soviet Union relies on its own strength in solving the problem of securing specialists for the national economy, science, and culture, and it solves it with great success.

Let us turn to some numbers. At present 24 million graduate specialists are employed in our country, or 126 times more than in prerevolutionary Russia. All of them are graduates of Soviet educational institutions. The replenishment of the national

economy and the various spheres of science and culture with skilled personnel is proceeding in a stable manner, and a tendency toward constant increases here is clearly observable. In 1974, for example, 693,400 persons received diplomas from VUZ's; in 1975, 713,400; 1976, 734,600, while in the present year about 750,000 persons will receive their diplomas.

The question can arise: How are these indicators coordinated with the true needs of the country? Every ministry and every department specifies annually the need for graduate specialists in its sector. These data, which are obtained from the results of a painstaking study of the present situation together with an estimate of anticipated prospects for development are sent to the USSR Gosplan, which compiles them and plans the magnitude of training to be provided for specialists. In order to imagine what great significance is given to the precision and validity of the figures in this plan, it is sufficient to say that they are singled out for examination in sessions of the highest organ of state power in our country, the USSR Supreme Soviet; after its approval they acquire the force of law.

Thus, the precise quantitative expression of the country's need for graduate specialists becomes the state plan for the output of the higher schools. But how is it fulfilled? Once again let us turn to some numbers. In 1974 the fulfillment of this plan came to 100.6 percent, in 1975, 101.4 percent, and in 1976, 102.3 percent. It is also being successfully fulfilled in the current year. As we see, there is practically complete correspondence [between plan and results]. As regards a certain degree of overfulfillment, it is very insignificant (1-2 persons in a hundred) and at the same time indispensable. We are speaking, after all, about people, and it is their nature to fall ill, and to take maternity leave, and even, as A. Rusov described it in his sketch, to become disillusioned with their chosen specialty.

So then--it turns out there is no problem at all! Unfortunately, this is not the case. I cited only general figures, which do not reflect patterns of regional distribution of highly skilled personnel, and it is precisely here that all is not well. A part of the graduates from the VUZ's find ways to avoid the planned distribution of specialists, and this leads to certain disparities. It is no secret, for example, that 34 percent of school teachers lack a higher education, while the majority of them work in the village. At the same time, many who possess diplomas in teaching have settled in the cities and are occupied with activities frequently very far removed from their VUZ specialty. A similar situation has arisen in several other areas.

Thus, the problem of primary importance is not a surplus of specialists but their proper and rational utilization. It is scarcely possible or expedient to resolve it by increasing or decreasing the output of the VUZ's alone. Other measures are needed here--educational, organizational, and social.

The program enacted by the 25th CPSU Congress for the social development of our society has been called upon to play, and is already playing, an enormous role in this area; it is directed toward the improvement of the material well-being of the Soviet people. Various benefits are being introduced according to plan for those who are employed in distant regions and in regions with severe climatic conditions. The regulation of wages and salaries for representatives of a significant number of professions and specialties is going on everywhere, and it will be completed before the end of the five-year plan. In particular, the salaries of young scientific workers, to whom, by the way, the protagonist of the sketch "Mnogovariantnyy Posudnikov" ["Multivariant Posudnikov"] belonged, are noticeably increasing.

The knowledge received by the graduates of our VUZ's must be utilized as originally intended. And LITERATURNAYA GAZETA's remarks concerning the rational utilization of highly skilled personnel raise without doubt an important problem.

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SHORTER WORK DAY, ADDITIONAL LEAVE FOR HAZARDOUS WORKING CONDITIONS

Moscow SOTSIALISTICHESKAYA ZAKONNOST' in Russian No 11, 1977 pp 47-49

[Article by G. Sevost'yanov, AUCCTU legal department sector chief: "Additional Leave and Reduction in Work Day for Hazardous Working Conditions"]

[Text] The existing legislation establishes for workers, engineering and technical workers, and employees additional leave and a reduction in the working day for work under unfavorable labor conditions in accordance with the list of production, shops, occupations and positions with hazardous working conditions. That list was approved by the USSR Council of Ministers State Committee for Labor and Wage Questions and the AUCCTU Presidium Decree of 24 December 1960. Its application has been regulated by an instruction approved by the USSR Council of Ministers State Committee for Labor and Wage Questions and AUCCTU Presidium Decree of 29 December 1962.

In connection with the introduction of new labor-payment conditions, changes have occurred in the designations of worker occupations. Therefore, the USSR Council of Ministers State Committee for Labor and Wage Questions and the AUCCTU Presidium approved, in a decree of 25 October 1974, a new and more precise list of the production, shops, occupations and positions with hazardous working conditions which entitle workers to additional leave and a reduced working day, and on 21 November 1975 they approved an instruction on the system for applying this list.

At enterprises, production associations and organizations where the minimum wage for workers and employees has been increased, with a simultaneous increase in the wage rates and salaries of middle-level worker categories, this list and the new instruction went into effect on 1 March 1976. At the remaining enterprises, organizations and institutions, the list will go into effect when the minimum wage is increased for workers and employees and the wage rate and salaries of middle-level worker categories are increased. Consequently, at enterprises and organizations of those branches of the national economy in which the new labor-payment conditions have not yet been introduced (trade, public catering and other nonproductive branches), additional leave and a reduction in the working day for work under hazardous conditions will temporarily be granted in accordance with the list of 24 December 1960 and under the system outlined by the instruction of 29 December 1962.

The 1975 instruction introduced several additions, changes and refinements into the system of granting additional leave and establishing a reduced work day.

The new instruction indicates that the designations of worker occupations and engineering-technical worker and employee positions outlined in the list are indicated in conformance with the unified skill-rate handbook of worker jobs and occupations, with the skills handbook of occupations of workers, communications workers and junior servicing personnel not in the unified skill-rate handbook of worker jobs and occupations which sets monthly salaries, and also with the unified list of employee positions ("Yedinyy tarifno-kvalifikatsionnyy spravochnik rabot i professiy rabochikh" [Unified Skill-Rate Handbook of Worker Jobs and Occupations], Moscow, NIItruda, 1976; "Yedinyy nomenklatura dolzhnostey sluzhashchikh" [Unified List of Employee Positions], Moscow, NIItruda, 1976).

USSR ministers and department leaders and Union republic Councils of Ministers can make changes or additions to the list with the concurrence of the USSR Council of Ministers State Committee for Labor and Social Questions, the AUCCTU and the USSR Ministry of Public Health.

The new instruction indicates a detailed list of materials which must be enclosed with USSR ministry and department and Union republic Council of Ministers suggestions for changes and additions to the list. These are: decisions by rayon (city) sanitation-epidemiological stations on the actual working conditions in production, shops and sectors where workers and engineering-technical workers and employees work and on whose behalf a petition is being submitted; organizational-technical measures worked out with the assistance of research institutes to eliminate production hazards in particular sectors, with the scheduled completion of this work being indicated; data on the number of workers and engineering-technical workers and employees involved in a question of granting additional leave or reducing the work day and on the additional expenditures for this purpose.

The instruction anticipates that, with the start-up of new enterprises, facilities and shops, the USSR ministries and departments and the Union republic Councils of Ministers will be obligated to review the question of the necessity of granting workers and engineering-technical workers and employees of those enterprises, facilities and shops additional leave and a reduced work day regardless of whether additional leave and a reduced work day have been established at existing enterprises releasing similar output. Including the necessary organizational-technical, medical and economic substantiation, the USSR ministries and departments and the Union republic Councils of Ministers inform the USSR Council of Ministers State Committee for Labor and Social Questions and the AUCCTU of each individual decision to grant workers and engineering-technical workers and employees additional leave and a shorter work day.

What is the system for granting additional leave and establishing a shorter work day under the list approved in 1974?

The right to additional leave in connection with hazardous working conditions is granted to workers or employees performing a job specifically outlined by the list, regardless of what branch the production or shop is in.

Workers and engineering-technical workers and employees whose occupations and positions are outlined in the section "General Occupations of All Branches of the National Economy" are given additional leave and a shorter work day regardless of what production or shop they work in if these occupations and positions are not outlined specifically in corresponding sections or subsections of the list.

The length of the additional leave has been set at 6-36 work days. It is granted simultaneously with the annual vacation. Refusal to grant annual vacation to workers and engineering-technical workers and employees entitled to additional leave for hazardous working conditions is prohibited (Article 74 of the RSFSR Labor Law Code). The additional leave cannot be carried over to the following year (1975 instruction).

In accordance with the list, full additional leave is granted to workers and engineering-technical workers and employees who have actually worked at least 11 months of the work year in production, shops, occupations and positions with hazardous working conditions.

Also included in the work record entitling such workers to additional leave are: temporary disability, maternity leave, the time women perform light jobs because of pregnancy or other jobs to which they have been transferred because they are breast feeding or taking care of children under 1 year of age, time spent on state and public obligations.

Annual leave is not granted to persons sentenced to corrective labor without deprivation of freedom while they are working out the punishment elsewhere (Article 44 of the USSR and Union republic Principles of Corrective Labor Legislation). They can receive leave for work under hazardous conditions if they have worked a full 11 months under hazardous working conditions when they begin their leave.

Substitution of monetary compensation for additional leave for work under hazardous conditions is not permitted. Payment of monetary compensation is possible only if the worker is dismissed.

Additional leave proportional to the time worked is granted to workers and engineering-technical workers and employees who have worked in production, shops, occupations and positions outlined in the list for less than 11 months of the work year.

Full additional leave can be granted workers and engineering-technical workers and employees employed full-time in production, shops and sectors with hazardous working conditions prior to the expiration of 11 months if the annual (basic) leave is [also] advanced.



If a worker's right to annual (basic) and additional leave arises at different times, these leaves are granted him simultaneously and in full. In this regard, the work record entitling him to vacation to be credited to the following work year is calculated separately for the annual (basic) and the additional leaves.

If, however, workers and engineering-technical workers and employees have worked in different production, shops, occupations and positions for which additional leave of different duration is granted, the time worked under hazardous conditions is calculated for each job individually and is based on the additional leave time established by the list for workers in the appropriate production, shops, occupations and positions.

Only those days on which the worker actually was employed at work under hazardous conditions for at least half the work day established for workers of the given production, shop, occupation or position are credited to time worked under hazardous conditions in production, shops, occupations and positions outlined in the list.

Given a list entry of "full-time employee" or "full-time worker," only those days on which the worker was actually employed at work under hazardous conditions for a full work day as established for workers of the given production, shop, occupation or position are credited to time worked under hazardous conditions in production, shops, occupations and positions outlined in the list.

These same rules also apply to the workers and engineering-technical workers and employees of outside organizations (construction, building and installation, construction-repair, start-up and setup, and others) and to workers of auxiliary and subsidiary enterprise shops (machine, repair, power, instrumentation and automation, and others) for the time they work in production, shops and sectors with hazardous working conditions where, in accordance with the list, additional leave has been established for the basic workers and the maintenance and service personnel of these facilities and sectors.

Leave for work under hazardous conditions, like other types of additional leave, is granted in addition to annual (basic) leave. Change in the length of the basic leave does not entail change in the length of the total leave. The USSR and Union republic Principles of Labor Legislation have established an annual leave of at least 15 working days. However, the total length of annual leave with consideration of additional leave granted for work under hazardous conditions remains unchanged.

A worker entitled to receive additional leave on several grounds in connection with hazardous working conditions is granted leave on one of those grounds. If he is entitled to different types of additional leave (for hazardous working conditions, for continuous employment at one enterprise), these leaves are generally totalled.

A reduction in working time for those working under hazardous conditions is established in accordance with the appropriate sections and points of the list

of production, shops, occupations and positions with hazardous working conditions which entitle workers to additional leave and a shorter work day. Work time is reduced if that is specifically outlined for the given production, occupation or position.

The list indicates work time reduction in work hours, given a six-day work week. Given a five-day work week, the established work week length is retained, with a corresponding increase in shift length, for those entitled to a shorter work day in connection with hazardous working conditions.

A shorter work day, of the length indicated in the list, is established for workers and engineering-technical workers and employees only for those days when they work under the hazardous conditions for at least half the shortened work day established for workers of the given production, shop, occupation or position.

If the list indicates "full-time employee" or "full-time worker," the time norm is decreased for workers only on those days when they actually work under the hazardous conditions for the entire shortened work day.

If the worker's occupation or position is not included in the list, but he works on certain days in production, shops, occupations or positions with hazardous working conditions as outlined in the list, a shorter work day is established for him on those days and of the same length as for workers and engineering-technical workers and employees employed full-time at those jobs.

The work day must not exceed 6 hours for those workers and engineering-technical workers and employees who have been employed at various jobs with hazardous working conditions during the course of the work day if reductions of different lengths have been established for those jobs and if they have worked a total of half or more of the maximum shorter day in such sectors.

On days when they have worked at existing production, shops and sectors with hazardous working conditions where a shorter work day has been outlined both for basic workers and for maintenance and servicing personnel at these production, shops and sectors, workers and engineering-technical workers and employees of outside organizations (construction, building and installation, construction-repair, start-up and setup and others) and workers of auxiliary and subsidiary enterprise shops (machine, repair, power, instrumentation and others) are also entitled to a reduction in the length of their work day.

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## IMPROVEMENT OF WAGE LEGISLATION

Moscow SOVETSKAYA YUSTITSIYA in Russian No 19, Oct 77 pp 5-7

[Article by L. Okun'kov, candidate of legal science]

[Text] The program for social development and improvement of the people's standard of living which was worked out by the 25th CPSU Congress provides for major national measures to improve remuneration. The social program for the 5-year period was enacted in the USSR law entitled "On the State Five-Year Plan for Development of the Soviet National Economy Between 1976 and 1980," which not only establishes the main directions, but also contains specific orders to the USSR Council of Ministers concerning performance of these measures. To implement this program the CC CPSU, the USSR Council of Ministers and the AUCCTU adopted a joint decree raising the minimum wage of workers and employees and at the same time raising rates and salaries of middle-income categories of workers employed in the non-productive sectors of the national economy. In accordance with this decree wages will be substantially raised an average of 18 percent for 31 million persons, which will cost the state more than 7 billion rubles per year (PRAVDA, 28 December 1976).

Purposive enhancement of the role of law as a regulator of the measurement of labor and of remuneration is quite typical of the development of socialist organization of remuneration in the present stage.

The wage legislation enacted in recent years has been an effective instrument in the social welfare policy of the party and Soviet state and an integral part of planned state management of the economy, and it has been the means whereby these measures were implemented in practice.

One of the distinguishing features of the measures being taken is the comprehensive approach to solving the problems of improving the organization of wages and financial incentives as a whole. The decree of the CC CPSU, the USSR Council of Ministers and the AUCCTU, in addition to dealing with the main task of raising the minimum wage and rates and salaries of middle-income categories of workers and employees, deals at the same time with these key problems: development of the wage-schedule system (improvement of wage levels and differentials of workers employed in different

sectors of the economy, more effective use of remuneration as an incentive for higher labor productivity); radical improvement of the organization of work and work norm setting; improvement of systems of remuneration (by the piece, time rates and the bonus system) and wide application of progressive forms of financial incentives which stimulate faster scientific-technical progress, improved product quality and lower production costs.

The central place in these measures is being given to improvement of the system of rate schedules as the basis for state wage regulation and to enhancement of its role in stimulating improvement of worker skills and performance.

The guaranteed minimum wage and also rates and salaries of middle-income categories of workers and employees are being raised substantially, which is the basis for an overall increase in the wages of personnel in the non-productive sectors. The next raise of rates and salaries in the nonproductive sectors will affect more than 30 million persons, whose annual income will increase by approximately 7 billion rubles. Reorganization of the system of wage schedules will ensure unity and will improve differentials in remuneration of workers employed in different sectors of the economy. The new rates and salaries of personnel in the service sector have as a rule been adjusted to levels of wages and salaries of workers in the production sphere whose activity is similar in nature. For example, personnel in trade, the food service industry and consumer services have been put on a par with the levels of rates and salaries of similar categories of personnel in light industry and the food industry. The rates of clerks, cashiers and other trade personnel dealing directly with the public have been set at the level of the wage rates of skilled workers in the enterprises of light industry and the food industry. The measures to institute new conditions for remuneration provide that the largest wage increase will be in those sectors where the wage level has been lagging considerably behind the levels that have been reached in other sectors. The overall increases in rates and salaries will be as follows: 23 percent in cultural and educational institutions, 20 percent in the administration, and 17-20 percent in housing and municipal services, trade and the food service industry.

Within each sector wage rates and salaries are being differentiated, as in the past, as a function of the complexity of the job and the working conditions. They reflect a closer correlation of remuneration to qualifications and performance, and they do away with the leveling of rates and salaries of skilled workers with those of unskilled workers, that is, to a great extent they meet the higher requirements for the quality of service. Preference is given to workers who have an impact on the performance of enterprises and organizations in the nonproductive sectors and on improvement of service to the public. This applies first of all to those who are employed in the most important and crucial sections, in jobs with difficult working conditions, and those who are involved in the application and activation of new technology.

Much attention is being paid to encouraging workers and employees to improve their qualifications. By contrast with the procedure previously in effect, broader use is made of certification, skill categories, and also supplements to rates and salaries for a high level of occupational skill. The conditions for raising salaries for skill categories on the basis of certification are being extended to nurses, laboratory assistants and pharmaceutical specialists who have secondary specialized education. Those who attain the first skill category in certification are given a corresponding salary raise. Somewhat more money can now be spent to raise the salaries of certified specialists of health care institutions: a maximum of 1 percent of the wage fund for these workers instead of the previous 0.6 percent. Teachers who in certification attain the title "Teacher and Methods Specialist" and "Senior Teacher" have been awarded higher salaries than those who do not have those titles. The skill category or title "Teacher and Methods Specialist" and "Senior Teacher" may be withdrawn after being awarded following recertification if substantial shortcomings are found in performance. So that salary levels are set properly as a function of abilities and qualifications, personnel of scientific research organizations will be recertified at the same time when the new rates and salaries are introduced in accordance with the procedure envisaged by Decree No 760 of the CC CPSU and USSR Council of Ministers dated 24 September 1968 and entitled "On Measures To Improve the Effectiveness of Performance of Scientific Organizations and To Speed Up Adoption of the Achievements of Science and Technology in the National Economy."

The decision of the CC CPSU, the USSR Council of Ministers and the AUCCTU instituting new wage conditions provides specific measures to improve the organization of work and work norm setting and to increase the effectiveness and quality of work done. USSR ministries and departments and other administrative agencies have been ordered to review the staff size allowances now in effect (service area norms, standard staffs and administrative structures), to draw up a list of intersectorial and sectorwide standard service times and other mandatory standards, to set targets for enterprises and organizations concerning the raising of present output quotas, and also to take steps toward devising and institution of standard labor inputs in operations for which these standards do not exist at the present time. The relevant administrative agencies must give targets to subordinate enterprises and organizations to review output quotas, which directors of those enterprises and organizations are then to take into account when they revise standard work inputs, which are subject to consent of trade union committees, thereby improving their quality and increasing the proportion of technically sound quotas.

A description of the new conditions for remuneration would be incomplete if we did not give an account of the content of measures to perfect the wage system and the financial incentive system: broader introduction of piece rates for workers, including a group piece rate for workers in enterprises of retail trade and consumer services, payment of mixed teams

doing loading and unloading work on the basis of the end results, and adoption of effective bonus systems. Directors of institutions and organizations have been granted permission to apply piece rates with consent of the trade union committee to the cleaning and maintenance of buildings, to repair, typing, dictation, copying and other work if there exist standard work inputs approved in the established manner. In scientific research institutions, project planning, design, survey and technological organizations, computer centers and scientific support organizations piece-rate payment may also be instituted for senior technicians and technicians, and in project planning and survey organizations and certain other organizations piece-rate payment may be instituted for engineers, architects and laboratory assistants. Piece rates are set on the basis of the minimum salary for the corresponding position or occupation, and that salary is increased by 20 percent if the work is governed by unified intersectorial output quotas or more progressive standard work inputs.

Progressive forms of financial incentives are being applied more widely to increase the amount of work done with fewer people. In the nonproductive sectors, just as in the sphere of physical production, directors of enterprises, organizations and institutions are allowed to assign supplements up to 30 percent of the rate (salary) to workers, engineering and technical personnel and other specialists, employees and service and building maintenance personnel for combining jobs or occupations, for expanding service areas or for increasing the volume of work to be done. The higher-level organization is allowed to apply those supplements in cases when remuneration of workers is governed by up-to-date and technically sound standard work inputs and when appropriate organizational measures have been taken, and finally, if this is economically expedient and is conducive to improvement of service to the public. The money to pay them comes from the saving on the wage fund achieved by having a smaller staff than called for by the intersectorial, sectorwide or other standard work inputs approved by higher-level organizations. These supplements may be reduced or completely abolished when quotas are reviewed or if performance deteriorates.

So as to achieve a unified approach to this type of financial incentive lists of occupations and positions to which such supplements can be assigned will be approved by ministries and departments and councils of ministers of union republics with consent of the corresponding trade union authorities; in the case of budget-financed organizations and institutions, the list will be approved by the USSR State Committee for Labor and Wages jointly with the AUCCTU, and they will be subject to consent of the USSR Ministry of Finance.

The pattern of activity of enterprises and organizations in trade, the food service industry and housing and municipal services has considerable importance to improvement of services to the public; the specific reference here is to operating schedules that provide for more rational use of manpower in those industries which at the same time are convenient for

the workers who are served. Introduction of these schedules will undoubtedly be facilitated by the special measures to award financial incentives to persons whose workday is divided in parts. Directors of organizations and enterprises have been given the power to assign a supplement up to 30 percent of the rate (salary) or piece wage to workers and employees who directly serve the public and who express a desire to work in a shift which has a break lasting more than 2 hours. The list of occupations and positions for which the supplement may be paid is being approved by the councils of ministers of the union republics and USSR ministries and departments, with consent of the corresponding trade union authorities.

One very typical characteristic of the measures being carried out in the field of remuneration is the substantial renewal of the entire set of standards and quotas. This applies not only to the innovations explicitly set forth in the decree of the CC CPSU, the USSR Council of Ministers and the AUCCTU, but also to new normative documents (regulations and instructions) which have been published to implement these decisions by the USSR State Committee for Labor and Wages and the AUCCTU, ministries and departments, enterprises, organizations and institutions with consent of the corresponding trade union authorities. For instance, jointly with the AUCCTU the USSR State Committee for Labor and Wages has approved standard lists of worker jobs and occupations to be paid at higher wage rates because of difficult and harmful working conditions; lists of occupations and jobs whose salaries (rates) are being raised and to which supplements and compensation are awarded because of special working conditions; and lists of individual worker occupations for which monthly salaries are established instead of wage rates, including the levels of those salaries.

The new pieces of labor legislation contain a number of specific procedures and methods for establishing the new conditions of remuneration; these are important to codifying normative material. First of all, they extend as a rule to a broader group of workers and employees and not only to those with medium income. Worker pay rate tables, lists of positions of employees and charts of their salaries cover practically all categories of workers, service and building maintenance personnel, and employees, including those with high income. Consequently, the wage schedules of more than 100 million workers, i.e., an absolute majority, are concentrated in just a few documents (10 at the most) concerning adoption of the new conditions for remuneration in the sectors of the national economy. This arrangement of the enactment facilitates the task of standardizing conditions for remuneration of persons employed in jobs which are similar in their character, scope and complexity or who are performing identical functions, and it makes it possible to eliminate a multitude of rates and salaries. For instance, workers in integral process occupations and positions are being assigned new rates and salaries regardless of departmental jurisdiction of the enterprise, institution or organization, this will substantially (by approximately half) reduce the number of salary charts from the present level and at the same time make remuneration more uniform.

So that the rates and salaries of middle-income workers in certain enterprises, institutions and organizations (and also certain occupations and positions) not covered in these decisions might be raised in good time, the USSR State Committee for Labor and Wages has been ordered jointly with the AUCCTU--and in the case of budget-financed organizations and institutions, with consent of the USSR Ministry of Finance--to establish conditions for their remuneration on the basis of conditions adopted for analogous enterprises, institutions, organizations, structural subdivisions and worker categories. This procedure indicates that the legislature has been sufficiently flexible and has created the possibility for rapid settlement of problems and introducing new wages and salaries before the deadlines envisaged for implementation of these measures.

The enactments raising rates and salaries mostly include new conditions for remuneration (levels of rates and salaries, certain types of supplements, and so on). They do not settle all questions that arise concerning establishment and application of the rate system. This is understandable since the official aim of devising quotas and standards in this stage is to provide a solution specifically to suit the new lines of development of the wage rate system and above all to set levels of new rates and salaries.

The codification and systematization of wage legislation should be looked upon as an altogether independent area of legislative work, one that is particularly relevant because of preparation of the Code of USSR Laws, which along with laws and ukases will include the most important joint decrees of the CC CPSU and USSR Council of Ministers, decrees of the USSR Government in the general normative field, including those which concern remuneration.

The organization of remuneration at the present time is characterized by a high level of saturation with normative material. At the heart of all this stand the Bases of Labor Legislation, which has relatively few articles, and joint decrees of the CC CPSU, the USSR Council of Ministers and the AUCCTU adopted in implementing national measures to systematize wages and to raise rates and salaries. It is in these decisions that a relatively stable system of remuneration has been given shape. Normative decisions in great numbers typically apply to the organization of the bonus system, compensation payments, and supplements to various worker categories. Standardization of these standards is the most difficult and complicated task. Creation of an effective system for legal regulation of remuneration, one that is comprehensible and accessible to the broad strata of workers, presupposes the publication of relatively few codified acts which would mainly contain standards that would apply generally.

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## RURAL CULTURAL-EDUCATIONAL SERVICES IMPROVEMENT STRESSED

Moscow TRUD in Russian 25 Nov 77 p 1

[Text] The CPSU Central Committee and USSR Council of Ministers have adopted a Decree "On Steps to Further Improve Cultural Services to the Rural Population."

The decree notes that the resolutions of the 25th CPSU Congress outline further increase in the role of socialist culture and art in the ideological-political, moral and aesthetic education of Soviet people, drawing the standards of living of the urban and rural population closer to one another, and strengthening the material base of cultural institutions, especially in rural areas. Over the last five-year period, steps were taken in the country to improve the system of cultural services to the rural population, to improve the activity and expand the network of cultural-educational institutions in rural areas. Construction of rayon Houses of Culture was broadened in scope and their role in leading the work of rural cultural institutions was increased.

At the same time, a considerable number of major rural population centers do not yet have stationary cultural-educational institutions. The content of the activity of many rural clubs, libraries and other cultural institutions does not meet fully the modern demands of ideological-education work or the growing cultural needs of rural laborers.

In a number of places, local party and Soviet organs make poor use of available opportunities for improving cultural-education work in rural areas, for organizing mass recreation and cultural services for the rural population and attracting the kolkhoz and sovkhoz community, especially the young people, to the activity of cultural and educational institutions. The necessary attention is not being paid to maintaining cultural-educational institution premises properly; repairs are not made at the proper time. Many of them do not have the necessary equipment, furniture, musical instruments and modern technical propaganda means.

There are serious shortcomings in movie services to the rural population, especially in small population centers, which frequently lack premises for showing movies. At the same time, the network of mobile film units has been cut back in recent years.

Television broadcasting in rural areas requires further development.

The necessary coordination is lacking in the work of cultural-educational institutions belonging to different departments, which leads to shortcomings in the leadership of rural cultural institutions. Insufficient work is being done on disseminating and introducing the experience of the leading rural cultural institutions into practice.

With a view towards further improvement in cultural services to the rural population, the CPSU Central Committee and the USSR Council of Ministers have obligated the Communist Party Central Committees of the Union republics and the kray, oblast, city and rayon party committees, the Union republic Councils of Ministers, the USSR Ministry of Culture, the USSR Council of Ministers' State Committee for Cinematography, the USSR Council of Ministers' State Committee for Television and Radio, the USSR Ministry of Agriculture, the USSR Ministry of Reclamation and Water Management, the USSR Ministry of Procurement, the USSR Ministry of Procurement, the USSR Ministry of Food Industry, the USSR Ministry of Timber and Wood Processing Industry, the USSR Council of Ministers' State Committee for Forestry, the Soyuzsel'khoztekhnika Association, the Tsentrosoyuz and the AUCCTU to work out and implement steps to improve cultural services to the rural population, to develop and evenly distribute cultural-educational institutions throughout the country, to raise the level of their work, and to strengthen their material and technical base.

It is necessary to make broader use of the opportunities of rural clubs, Houses of Culture, libraries and other cultural institutions to mobilize rural laborers to carry out the economic and social development plans and production tasks, for organizing cultural recreation, developing socialist competition and propagandizing leading experience and knowledge of agricultural technology.

The Union republic Councils of Ministers are encouraged, in working out draft plans for economic and social development:

- to anticipate allocating capital investments first for construction of rural cultural institutions, for creating rural cultural complexes, and for strengthening the material base of rural clubs, general-use libraries and film projection facilities through the funds allocated the republics for the "culture" branch;

- ensure further development of the network of club institutions, general-use libraries, rayon Houses of Culture of the USSR Ministry of Culture system and film projection facilities of the USSR Council of Ministers' State Committee for Cinematography system. Also outline development of the network of rural club institutions, general-use libraries and film projection facilities of the trade-union organizations and kolkhozes if they are offered;
- continue building clubs at state agricultural enterprises;

- take steps to complete in the Tenth Five-Year Plan construction previously begun of cultural-educational institution projects in rural areas.

The USSR Gosplan is instructed to allocate appropriate capital investments and material resources for these purposes in the amounts outlined for the 1978-1980 period by the five-year plan.

In order to further develop the initiative construction of club buildings by kolkhozes, the USSR Gosplan and the Union republic Councils of Ministers will anticipate, in working out the draft plans for economic and social development the allocation of appropriate funds for materials and equipment to build clubs in rural areas, putting them up using the means of kolkhozes, interkolkhoz and interfarm associations.

With a view towards expanding television broadcasting in rural areas and strengthening the material base of television, the Union republic Councils of Ministers have been permitted to build and install in rural areas satellite-system television reception installations, low-power retransmitters and trunk lines for them through funds generated by incomes exceeding expenses in the budgets of the Union and autonomous republics, krais and oblasts above the total amount of capital investments planned for them. Ministries, departments and individual enterprises and sovkhoses are granted the right, and it is recommended that kolkhozes also carry out the indicated construction using their own means.

The ministries, departments, individual enterprises, sovkhoses and kolkhozes concerned have also been permitted to combine the state capital investments allocated for these purposes, their own funds and the funds of kolkhozes, interkolkhoz and interfarm associations. The USSR Ministry of Communications will accept on balance satellite-system television reception installations, low-power retransmitters and trunk lines whose construction is complete and will provide the technical equipment for them, and the Ministry of Communications Equipment Industry will increase the production and delivery to the USSR Ministry of Communications of satellite-system reception installations with low-power retransmitters to 700 units per year in the 1978-1980 period.

The USSR ministries and departments and the Union republic Councils of Ministers are granted the right to build clubs and Houses of Culture following standard plans for facilities with up to 600 seats, as well as other premises attached to the clubs for enterprises located in rural areas, using capital investments allocated for the construction of production projects without reducing assignments for the start-up of production capacities and fixed assets.

The Union republic Councils of Ministers, the USSR Ministry of Agriculture, the USSR Ministry of Reclamation and Water Management, the USSR Ministry of Procurement, the USSR Ministry of Food Industry, the USSR Ministry of Timber and Wood Processing Industry, the USSR Council of Ministers' State Committee for Forestry, the Soyuzsel'khoztekhnika, the Tsentrosoyuz and local soviet organs will take steps to implement in 1978-1980 the repair and setting in proper order of the rural clubs, Houses of Culture and libraries subordinate to them, as well as premises for showing movies, and will equip them with the necessary inventories, furniture and fuel supplies.

The CPSU Central Committee and the USSR Council of Ministers have pointed out the necessity of attracting more of the kolkhoz and sovkhoz community, more young people in institutions and enterprises, and more schoolchildren to operating rural cultural institutions.

The ispolkoms of rayon (city) Soviets of People's Deputies have been permitted to accept in the balances of local Soviets of People's Deputies Palaces and Houses of Culture and clubs built by kolkhozes following standard plans at the request of the kolkhozes in the established order and within the limits set in the state plan for economic and social development of the USSR network of club institutions.

The USSR Ministry of Culture and the USSR Council of Ministers' State Committee for Cinematography are, together with the AUCCTU, obligated to anticipate the broader development and multipurpose use of mobile technical means -- clubs on wheels, libraries on wheels and mobile film projection facilities -- to organize under a unified plan cultural services to small rural population centers lacking stationary cultural institutions, and to work out and approve a statute on the system and conditions for operating clubs on wheels and mobile film projection facilities.

Sovkhozes and other state agricultural enterprises have been granted the right to use funds planned for mass cultural work to pay for film showings and concerts organized at field camps and on livestock herding farms and sectors.

The appropriateness has been recognized of creating an All-Union Interdepartmental Council for Cultural-Educational Work, attached to the USSR Ministry of Culture, to coordinate and organize purposeful work by cultural-educational institutions (on public principles). Jointly with the AUCCTU and the USSR Ministry of Agriculture, the USSR Ministry of Culture is to work out and approve within three months a statute on the All-Union Interdepartmental Council for Cultural-Educational Work.

The USSR Ministry of Culture is instructed to ensure methods leadership of the operation of rural cultural-educational institutions, regardless of their departmental affiliation, to take steps to assign skilled personnel to them, to organize systematic improvement in the skills of workers in rural cultural institutions, and to approve, with the concurrence of the USSR Ministry of Finance and the AUCCTU, norms for financing expenditures to equip rayon, city and rural Houses of Culture and clubs with cultural inventory, musical instruments and technical means.

The Union republic Councils of Ministers are obligated to approve, within these norms, a list of cultural inventory, musical instruments and technical means for Houses of Culture and clubs, with consideration of the peculiarities of the Union and autonomous republics, krays and oblasts.

With a view towards assigning specialists to work in rural cultural institutions, it is suggested that:

the USSR Gosbank grant five-year loans of up to 1,000 rubles to young specialists who have graduated from higher or special secondary academic institutions and been assigned work in rural cultural institutions and the film network to establish their households, repayment of the loans to begin in the third year after their receipt;

the Union republic and autonomous republic Councils of Ministers and the ispolkoms of kray and oblast Soviets of People's Deputies work out and implement measures to provide all cultural-educational workers and projectionists living and working in rural areas with free apartments, including heat and lights.

It has been established that cultural-educational workers and film operators in rural areas and the family members living with them retain the right to free apartments, including light and heat, when they retire on pensions if the total length of employment of the indicated workers in rural areas has been at least 10 years. The conditions qualifying one for state pension security, grants and the granting of other types of security under state social insurance outlined in the 20 July 1964 USSR Council of Ministers Decree "On State Pension Security and Social Insurance for Kolkhoz Chairmen, Specialists and Machine Operators" have been extended to kolkhoz specialists with a higher or special secondary education working in their specialties in kolkhoz cultural institutions.

It is recommended that kolkhozes pay the wages of leaders of artistic independence collectives in accordance with the 24 December 1976 CPSU Central Committee, USSR Council of Ministers and AUCCTU Decree, and also that they establish additional payments, in individual cases, for active mass cultural work in rural areas by club workers and film operators in an amount of up to 30 percent of their salaries.

With a view towards improving cultural services to rural laborers, it has been decided to expand the production of technical means of culture (clubs and libraries on wheels, mobile film projection facilities, and others). The USSR Gosplan has been instructed, in working out the annual USSR economic and social development plans, to outline the allocation to the RSFSR Council of Ministers of additional vehicle chasses for these purposes and to the USSR Council of Ministers' State Committee for Cinematography of mobile film projection facility vehicles and sidecar motorcycles for movie operators to service rural stationary film projection facilities.

The Soyuzsel'khoztekhnika is entrusted with organizing the servicing of cars and trucks (their subassemblies and units, and also automobile chasses and motors) used by local organs of the USSR Ministry of Culture, the USSR Council of Ministers' State Committee for Cinematography and the AUCCTU for specialized motor transport conforming to the list of vehicle makes which the Soyuzsel'khoztekhnika services.

The CPSU Central Committee and USSR Council of Ministers have expressed their confidence that the Communist Party Central Committees of the Union republics, the kray and oblast party committees, the Councils of Ministers of the Union

and autonomous republics, the ispolkoms of kray and oblast Soviets of People's Deputies and all movie and culture workers will take the steps necessary to carry out successfully the resolutions of the 25th CPSU Congress on further developing Soviet socialist culture in the countryside and improving cultural services to the rural population, that they will guide all the diverse cultural and educational activities in rural areas towards the harmonious development of personality, towards enriching spiritual life and towards developing high communist consciousness among laborers. All this will also have a beneficial effect on the solution of political, economic and social tasks facing agriculture laborers.

11052

CSO: 1823

## ARMENIA PROMOTES SOCIAL SCIENCE FOR SECONDARY SCHOOL SENIORS

Moscow KOMMUNIST in Russian 26 Nov 77 p 1

[Article: "In the Armenian Communist Party Central Committee"]

[Text] The Armenian Communist Party Central Committee has adopted a Decree "On Steps To Further Improve the Teaching of Social Sciences in Republic General Education Schools."

The decree adopted noted that party gorkoms and raykoms and republic organs of public education, governed by the resolutions of the 24th and 25th CPSU Congresses, will work specifically to raise the level of instruction of the social sciences course in graduating classes of the general education schools, viewing it as an important means for ideological-moral up-bringing of the students, of shaping in them the foundations of a Marxist-Leninist world view, of communist conviction and social-political activeness, and of implementing the overall task of all-around development in school.

In many schools, interesting forms of work have evolved which facilitate raising students on the revolutionary, fighting and labor traditions of the Soviet people. Thanks to the steps being taken, students are successfully mastering habits of independent work on the works of the classics of Marxism-Leninism and are displaying greater interest in and better knowledge of the resolutions and materials of the CPSU Congresses, the CPSU Central Committee plenary sessions, and other party documents.

At the same time, the decree notes that there are shortcomings in the organization of social sciences instruction in the republic's general education schools.

In individual schools, little attention is paid to developing pupil cognitive activeness and independence of thought in the social sciences instruction process. The subject is sometimes taught without the necessary linking of theoretical problems to the practical building of communism, to purposeful development of a class approach to evaluating the events and phenomena of the historical past and contemporary social life. In a number of schools, social

science lessons are uniform, without consideration of the specifics of the subject or the use of didactic visual aids, and little consideration is given to the ages of the students. At the instruction level, the poor linking of social science to other school disciplines and the absence of a number of subject study aids in Armenian have a negative effect. Questions of the shaping of communist morality, labor education and intolerance towards antipodes of the Soviet way of life do not find the necessary reflection sometimes in social science instruction.

With a view towards eliminating shortcomings in social science instruction in the republic general education schools, the Armenian Communist Party Central Committee has instructed that:

- party gorkoms and raykoms and the Armenian SSR Ministry of Education work out and implement concrete steps to decisively improve social science instruction in the schools, to perfect the public education system in light of the demands of the 25th CPSU Congress on an overall approach to organizing the whole education process -- ensuring the close unity of ideological-political, labor and moral education;

- take steps to further improve the qualitative composition of social science teachers and the state of social science instruction in light of the demands of the 25th CPSU Congress;

- attract social science teachers more broadly to the universities of Marxism-Leninism attached to the Yerevan, Leninakan and Kirovakan party gorkoms in order to improve their ideological-theoretical training. Organize for them continuous theoretical seminars, lecture series and consultations attached to the party gorkoms and raykoms;

- the Armenian SSR Ministry of Education strengthen its supervision of the activity of the leadership and teachers' councils of the schools, of the work of social science teachers, and that it demand of them greater effectiveness and a higher scientific level of instruction, the extensive use of inter-subject ties, graphic and technical means of training in the study process, that a persistent effort be made to achieve a situation in which each lesson is interesting, substantive and purposeful, that it is conducted closely linked to life, that it foster in the students interest in and habits of independent study of the works of the classics of Marxism-Leninism, CPSU documents, and works of the international communist movement;

- systematically study and disseminate the leading work experience of social science teachers and encourage and stimulate the most outstanding among them;

- the Armenian SSR Ministry of Education and the Armenian SSR Council of Ministers' State Committee for Publishing Houses, Printing Plants and the Book Trade ensure the publication of a number of study aids, methods aids and visual aids for social science teachers in 1979-1980;

- the Armenian SSR Ministry of Higher and Secondary Special Education and Ministry of Education carry out specific steps to set up continuous assistance by the social sciences departments of republic VUZ's to general education schools in order to improve the professional training of social science teachers;



the Armenian SSR Ministry of Education and the Central Committee of the Armenian Komsomol take steps to substantially improve work among students outside classes and outside school, institute the practice of holding republic reviews of work by [school] seniors on problems of philosophy, political economics and scientific communism within the framework of social science, as well as on questions of CPSU history, Komsomol history and the history of the international youth movement, actively enlisting in this work student scientific societies and VUZ social professions departments.

The Armenian Communist Party Central Committee has obligated party gorkoms and raykoms, the republic Ministry of Education and local public education organs, the leadership of teacher collectives and school party organizations to closely coordinate [their] work on improving the quality of social science instruction with thorough study by students of the materials of the 25th CPSU Congress, the new USSR Constitution, the resolutions of the October (1977) CPSU Central Committee Plenum and the documents of the extraordinary 7th Session of the USSR Supreme Soviet, L. I. Brezhnev's report "Great October and the Progress of Humanity," the materials of the festive meeting of the CPSU Central Committee, USSR Supreme Soviet and RSFSR Supreme Soviet devoted to the 60th anniversary of the Great October Socialist Revolution.

The editorial staffs of republic newspapers and magazines and the Armenian SSR Council of Ministers' State Committee for Television and Radio have been instructed to publish and broadcast more material devoted to questions of social science instruction, to increasing its role in the ideological-political development of secondary school students, and to periodically organize radio and television series to help social science instructors.

11052

CSO: 1822

## TRAINING ENGINEERS FOR LIGHT INDUSTRY

Moscow KOZHEVENNO-OBUVNAYA PROMYSHLENNOST' in Russian No 10, 1977 pp 49-52

[Article by Professor I. P. Strakhov, doctor of engineering sciences, RSFSR Worthy Scientist and Technician, and rector of the Moscow Technological Institute for Light Industry]

[Text] The MTILP [Moscow Technological Institute for Light Industry] attained the age of 47 in April 1977. This institute was the Soviet Union's first specialized higher educational institution given the task of organizing the training of specialists for light industry, which has been developing at a very fast pace from a largely handicraft industry in pre-revolutionary Russia into a highly mechanized socialist industry. Throughout all the years of its activity the institute's staff has done and is now doing a great deal of work to train engineers for light industry whose theoretical preparation and knowledge of production practices are at the present-day level of science and technology and of practices in advanced enterprises.

Since 1930 the institute has trained more than 16,000 highly qualified specialists for the country's light industry. Over the last decade the number of specialists graduating has increased sharply because a branch of the institute was organized in Novosibirsk. During the years of the 10th Five-Year Plan 4,735 specialists will be trained in the MTILP in 9 specialties for the following branches of light industry: footwear, leather, sewn garments, the artificial leather and film industry, the tannin industry, the leather accessory and saddle industry, the fur industry and the sheepskin coat industry.

In the institute engineers and scientific specialists are now being trained by 28 professors and doctors of science and more than 180 candidates and docents. The number of instructors with academic degrees and titles represents 65 percent; 18 professors and 11 docents head the institute's 29 departments.

Thanks to the improved performance of the teaching staff, the development and improvement of the teaching process, steps taken to organize the

teaching process on a scientific basis, expansion of technical facilities, computer equipment, and film and television equipment for teaching purposes, and improvement of forms for individual academic training work with students there has been a considerable improvement in the quality of the training of specialists for light industry.

During the last 5-year period the institute organized six laboratories for computer equipment which have electronic computers and analog computers. There are 10 digital computers, more than 60 analog computers, key-driven calculators, and the student computer room at the disposition of students, graduate students and instructors of all departments.

Students in all specialties learn the basics of computer programming and go through a digital computer laboratory training course. This has made it possible for engineers and specialists to use the digital computer in doing computations and graphs as part of their homework and course projects. The institute has achieved widespread use of the digital computer in diploma projects: whereas in 1972 only 10 percent of the students used the digital computer, in 1977 this figure was 95 percent.

Work is being done to set up the ASU-MTILP [Computerized System for Management of the MTILP]. The professors and instructors are working continuously to further improve the content of courses in general theory, engineering and specialized fields, the content of laboratory exercises and workshops, and the topic list of course and diploma projects.

In recent years it has become established practice in the institute for students to do their diploma projects on assignment from the industry.

This practice of doing what we call "real" diploma projects developed as part of the work to fulfill long-term contracts concerning creative cooperation with the Moscow Footwear Production Association Zarya and the Moscow Leather Production Association. Under these contracts the institute's teachers and students extend scientific-technical aid to enterprises in solving problems of improving product quality, of perfecting technological processes, of training and improving the qualifications of engineering and technical personnel, of speeding up adoption of scientific developments in production, etc. The constant improvement of diploma projects on real topics set by the enterprise has made it possible to develop a very effective procedure for organizing work on diploma projects. This is the interdisciplinary diploma project. Here are a few examples. Nineteen students in various specialties: technologists, designers, economists and mechanical engineers of this institute as well as students of the Moscow Engineering and Construction Institute imeni V. V. Kuybyshev worked on performance of an interdisciplinary diploma project on the topic "Reconstruction of the Parizhskaya Kommuna Footwear Factory." The most promising technological processes in footwear production and progressive equipment were the basis of the project: high-output flows, semiautomatic lines, injection molding machines, etc. A wide assortment of shoe models

meeting the demands of consumers was developed for each flow. The project solved in a new way problems related to the architectural layout of the factory's buildings and installations.

Another example: on commission from the Moscow Leather Production Association students of four specialties (a chemical technologist, an economist, a mechanical engineer and an automation specialist) prepared the plans of a semiautomatic leather plant which is to be built and put into operation to replace the leather association's branches Nos 1 and 2.

The practice of doing interdisciplinary diploma projects is having a favorable impact because it arouses greater motivation and initiative on the part of the diploma candidates themselves and because it compels them to undertake adoption of technical solutions on the basis of a thorough study of real conditions and prerequisites. Further development of interdisciplinary diploma projects and extensive involvement of students in performing projects arising out of creative cooperation with enterprises not only helps to solve scientific-technical problems important to industry, but it also helps to improve the quality of training of specialists who can adapt more quickly in the workplace.

At enterprises of the Zarya Footwear Association 120 engineers are graduates of the institute, and 27 are working in supervisory positions. The situation is much the same in the Moscow Leather Production Association, where 138 graduates of the MTILP are working, 38 of them supervisors.

The work to improve the practice of interdisciplinary diploma projects must, of course, continue. We are now thinking about the problems of more thorough coordination of the various parts of the interdisciplinary diploma projects and we are summarizing the experience that has been acquired so as to work out recommendations that will be of help both to students and also to instructors serving as consultants.

A number of problems also have to do with production associations and enterprises. They must be timely and thorough in preparing topics for diploma projects if the latter are to reflect the most relevant production problems whose solution will help to raise production efficiency. More vigor is needed in promoting industrial adoption of the students' development. It would be good if close creative ties were established between the student scientific society and councils of young specialists for joint performance of scientific research projects aimed at solving current production problems. There is room for quite a bit more improvement in the caliber of supervision of production training at certain enterprises. These and other measures have been outlined by the RSFSR Ministry of Light Industry, which has approved the experiment of the institute's cooperation with production associations and has decided to disseminate it more widely.

The RSFSR Ministry of Light Industry is providing for the institute to receive constant help in improving its facilities used in teaching and in supplying laboratories with sets of up-to-date equipment.

Performance of measures to improve production training and trainee programs, extensive student participation in projects based on creative cooperation with enterprises, and development of interdisciplinary diploma projects on real topics set by enterprises are an important means of training energetic young specialists who think creatively, who have a good understanding of the needs of present-day production, and who adapt well to independent activity as engineers and supervisors.

Carrying out the decisions of the party and government concerning improvement of ideological training in VUZ's, the party and public organizations, the rector's office, the deacon's offices and the departments have substantially enriched the content and expanded the forms of work with students in the field of political ideology. This work is governed by a unified ideological training plan covering all the years of the students' course of study; a unified plan has been prepared for work to develop the student's general outlook, student scientific clubs, the young reader's school, and the faculty of public professions have been expanded, and students in all years of study have become involved in practical civic and political work.

The staff of professors and instructors has paramount importance in the training of highly competent specialists. During the 47 years of the institute's activity 670 candidates of science and 35 doctors of science have been trained. Scientists are being sent both to educational institutions and also industrywide scientific research institutes.

Graduate study is the principal form of training science teachers. So as to further improve the quality of training of science teachers in the graduate program a prospective plan has been prepared in the institute for the 1976-1980 period on the basis of statements of needs from VUZ's and industry and also including the science teachers who will be needed for the institute and its branch in Novosibirsk.

During the 10th Five-Year Plan planned enrollment in the graduate program is to be increased 131 percent over the previous 5-year period. Scientists with high qualifications are also being trained in a planned way by upgrading docents to senior staff specialists so that they can prepare doctoral dissertations, and creative leave is being granted so that doctoral dissertations can be completed. During the 10th Five-Year Plan the enterprise plans to upgrade 12 docents to senior staff specialists and to grant creative leave to 6 docents.

One of the effective ways of training scientists, of improving the qualifications of VUZ instructors, and also of extending real aid to industry is for teachers to conduct scientific research projects.

The scientific research activity of the institute's staff of professors and instructors is oriented toward further treatment of the problem entitled "Development of New Materials and Methods for Improvement of Equipment

and Technology and Improvement of Product Quality in Light Industry." Work is being done on this problem under nine interdisciplinary topics.

Almost all the professors and instructors are taking part in work on the interdisciplinary topics, the student body is extensively involved, and there is close cooperation with industry.

Throughout all its activity the institute strives to maintain close relations with related VUZ's in the Soviet Union and abroad. Since it is the principal VUZ for the country's light industry, the institute is constantly extending scientific and scientific method aid to other VUZ's. During the Ninth Five-Year Plan alone 131 instructors from 17 VUZ's went through training programs in the institute's departments. The institute has turned over to related VUZ's more than 200 titles of documents on teaching methods in order to extend help in organizing work on teaching methods and scientific research, and it has organized the necessary consultations and reviewed teaching projects and projects on teaching methods. A familiarity with the way instruction is set up in the chairs and schools of the MTILP has been furnished 196 instructors from 38 of the country's VUZ's, and they have been given methodological manuals and instructions, consultations on scientific organization of the teaching process, supervision of course and diploma projects, the conduct of practical training, the monitoring of the trainee program and organization of independent student work. Many leading professors and docents travel every year to present lectures and extend aid in scientific research and methods.

The plan for the 10th Five-Year Plan calls for expansion of creative relations with related VUZ's of our own country and the socialist countries. Planned enrollment in the regular graduate program for related VUZ's has been increased from 25.2 to 31.1 percent of the total number of acceptances, which represents 162 percent of enrollment during the Ninth Five-Year Plan.

Creative cooperation with foreign higher educational institutions of Bulgaria, Czechoslovakia, Hungary, Poland and Algeria will be further expanded and developed.

In this anniversary year the institute's task is working selflessly to fulfill the plan for development of the Moscow Technological Institute for Light Industry, which calls for the following in the 10th Five-Year Plan:

- i. further development and improvement of teaching and methods work;
- ii. scientific organization and management of the teaching process and of independent student work;
- iii. expansion and improvement of performance in the training, improvement of qualifications, assignment and use of professors and instructors;

- iv. further improvement of the effectiveness of scientific research and of the level of training of graduate students and the caliber of dissertation projects;
- v. further improvement and refinement of ideological training and a rise in the level of ideological theory in the teaching of the social sciences;
- vi. improvement of the financial situation, housing and living conditions of students;
- vii. development of the plant and equipment of the institute and of its branch in Novosibirsk;
- viii. further development of the branch in Novosibirsk and its transformation into an independent higher educational institution;
- ix. measures to extend scientific aid and aid in scientific methods to related VUZ's.

Performance of the measures outlined for the 1976-1980 period will guarantee a rise in the level of training and political-ideological indoctrination of engineers for light industry.

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CSO: 1822

## ECONOMIC INCENTIVE AND REDUCTION OF LABOR INPUTS IN THE PETROLEUM INDUSTRY

Moscow EKONOMIKA NEFTYANNOY PROMYSHLENNOSTI in Russian No 10, 1977 pp 23-27

[Article by S. M. Levin, Ministry of Petroleum Industry; submitted 24 July 1977]

[Text] The system of financial incentives has been shaped in the petroleum industry as an important element of the economic mechanism of management. Beginning in 1967, when the industry's associations were converted to the new system of planning and economic incentives, the method used in building up incentive funds, as it gradually improved, has been an immediate factor in raising production efficiency. All the while the share of bonus payments from the material incentive fund has been steadily growing.

The rise of labor productivity is the most important industrywide indicator of production efficiency in the petroleum industry. From the first year of its institution the system for building up incentive funds in the industry has been motivating more rational utilization of manpower. Particular attention has been paid to intensifying the economic motivation of petroleum-producing associations to raise labor productivity and to carry out broad programs to mechanize and automate production. Since the principal potential for raising labor productivity in the petroleum industry at the present stage of this development lies in reducing labor inputs per well, a portion of the material incentive fund is formed as a direct function of that indicator.

In the 1967-1976 period specific labor inputs per well were reduced from 2.63 to 1.83 men (the figures are based on all petroleum and gas wells in operation and take into account the numerical composition of industrial production personnel in 1976, assuming a two-tier management structure). Over that period of time labor productivity in the petroleum industry rose 85 percent, while the average wage per worker among industrial production personnel rose 58 percent.

Substantial work was done in the years of the Ninth Five-Year Plan to reduce specific labor inputs by virtue of full automation of 138 RITS [Regional Engineering Technology Services]. Labor productivity in the petroleum industry rose 34.8 percent during the Ninth Five-Year Plan, and a



substantial portion of this was achieved by reducing specific labor inputs from 2.30 to 1.91 men per well. This meant that more than 90 percent of the growth of petroleum production was achieved by virtue of the rise in labor productivity. Remuneration of petroleum industry workers also increased. The average worker wage among industrial production personnel rose 24.7 percent during the 5-year period. In 1976, the first year of the 10th Five-Year Plan, labor productivity in the industry rose 5.2 percent, while the average wage rose 4.9 percent. Relatively high growth of the average wage must be guaranteed in the petroleum industry because of the difficult working conditions as compared to other industries. The relationship in wage levels unfavorable to the petroleum industry must be corrected during the 10th Five-Year Plan. This problem can be solved only if labor productivity grows faster than wages. This is all the more important because output per worker in the industry is to increase 29 percent during the 10th Five-Year Plan (a higher level than in the national economy as a whole) and also because one cannot count on a sizable influx of new personnel into the industry. Thus the development of the petroleum industry in the near future must be based on widespread adoption of programs embodying technical progress and on rational organization of the entire set of operations so as to achieve a saving on manpower resources in all phases of the technological process of petroleum production. The financial incentive system must operate unfailingly in that direction. Full automation of petroleum production enterprises was effectively continued during 1976. Twenty-four RITS were automated during the year, which meant a reduction of specific labor inputs in the industry from 1.91 in 1975 to 1.83 men per well in 1976, i.e., by 4.2 percent. Since average well productivity for the year hardly increased at all, the role of the reduction of specific labor inputs has increased still more as a factor in the overall rise of labor productivity. During 1976 alone the reduction achieved in this indicator corresponds to a hypothetical elimination of 3,500 workers. Given this great importance of reduction of the specific number of workers as an indicator, economic levers promoting the rise in labor productivity had to be strengthened correspondingly.

During the Ninth Five-Year Plan a part of the material incentive fund created in the industry was built up on the basis of standard deductions from total calculated profit for each percentage point of reduction of specific labor inputs. During the 10th Five-Year Plan a part of the material incentive fund is created by using rates of deductions per ton for each percentage point of reduction of specific labor inputs in order to intensify the incentive to raise labor productivity. Use of this system is creating a larger share of the material incentive fund assigned to stimulation of the rise of labor productivity than in previous years, and it also figures as an additional incentive for producing the largest possible amount of petroleum. In 1977 the rates per ton based on reduction of specific labor inputs were established for Glavtyumenneftegaz [Main Administration for the Petroleum and Gas Industry of Tyumenskaya Oblast] and 19 production associations. Because of particular conditions in the development of a number of petroleum regions, planning targets for reduction of specific

labor inputs and consequently the rates per ton of deductions based on that indicator were not assigned to six production associations. This is a temporary solution to the problem. In the coming years of the 10th Five-Year Plan the rates per ton based on reduction of labor inputs are to be extended to all production associations in the industry. At the present time about 10 percent of the material incentive fund of petroleum production associations is based on this fund-regulating indicator; this proportion varies substantially in large and small petroleum regions as a function of the relative share of industrial production personnel. As much as 65 kopecks per ruble of the relative wage saving for industrial production personnel achieved by reducing specific labor inputs is assigned to the material incentive fund. This effectively motivates petroleum production enterprises to save on labor inputs. But this kind of effective incentive has an impact only on a part of social labor inputs in the industry, a minor part at that, since it exclusively concerns industrial production personnel. The fact that the petroleum industry has sizable labor inputs in auxiliary operations makes it a necessity to conduct experiments to develop an incentive system for reduction of total (aggregate) labor inputs. Research in this direction is now being conducted.

The assignment for reduction of specific labor inputs during the 10th Five-Year Plan has become the principal planned indicator for raising production efficiency from the standpoint of petroleum production associations. Accordingly, in order to create maximum financial motivation for performance of the planned target for reduction of specific labor inputs, if the plan is not fulfilled, transfers to the material incentive fund on the basis of this indicator are reduced even further by applying the coefficient 0.3 to the relevant rate per ton.

A considerable number of measures to economize on labor resources are to be performed in petroleum regions. This applies particularly to regions (there are 15 of them) where the level of specific labor inputs is higher than the industry average. Of the petroleum regions in the European part of the country this applies above all to the Kuybyshevneft', Permneft' and Orenburgneft' production associations. Up to now labor inputs in petroleum regions which are drilling large numbers of wells in deposits--in Western Siberia and Mangyshlak Peninsula--have been higher than the industry's average level. However, it is precisely in those regions where labor resources should be expended with the greatest economy because of the higher wages and larger outlays for housing and to provide cultural and consumer services. The share of the material incentive fund based on the indicator of reduction of labor inputs ought to be enlarged considerably in those regions so as to create a greater financial incentive to raise labor productivity.

It is a complicated problem to make incentives effective within an economic complex such as a production association in the petroleum industry, which consists of enterprises, production units and entities in a variety of activities. Adoption of a system whereby the funds of the production

association are formed on the basis of the final results--production of petroleum and gas--made it a necessity to work out a system of fund allocation within the association which would give the collectives of all structural subdivisions of the association an immediate financial motivation to achieve that ultimate goal. This applies first of all to drilling enterprises, which are creating the new capacity for petroleum production. The system whereby funds were built up in drilling activity during the Ninth Five-Year Plan, which was based on the indicator of calculated profitability and whose purpose was to motivate a rise in the efficiency of the drilling process proper, by and large performed its function. Wells were sunk faster, the profitability of drilling operations increased, cost accounting was tightened up, and the financial strength of drilling enterprises was enhanced. Drilling workers were paid much larger incentives. But important shortcomings and sizable unused potential still exist in the performance of drilling enterprises. The long period of time required to complete wells, the low level of effective utilization of drilling time, large losses because of down time resulting from bad organization and because of unacceptable work, and the absence of a motivation to turn wells over to petroleum production enterprises on a regular basis and ahead of schedule--all of these adverse factors lowered the level of efficiency of drilling even in 1976 and demonstrated that profitability is not effective enough as an indicator. This necessitated a reassessment of the economic levers in effect in drilling. Assignments to the incentive funds of drilling enterprises ought to be oriented toward motivating an achievement of the final results of the activity of the production association. Accordingly, the incentive system of drilling enterprises during the 10th Five-Year Plan ought to promote a reduction of the time required to complete wells and therefore uniform delivery of wells to NGDU [Petroleum-Gas Production Administration] throughout any particular calendar period. The collectives of drilling enterprises must have a financial motivation to speed up the activation of new petroleum production capacities and thereby to lengthen the period of their operation in NGDU's in the course of the year. This will provide a linkage of the system for allotting funds to drilling enterprises with the procedure for forming incentive funds of the production association on the basis of the rates per ton, and it also makes the allotment of funds to drilling enterprises directly dependent on the rise in the effectiveness of drilling.

Labor inputs for the entire set of operations involved in completing petroleum and gas wells and a target for reduction of that time are set for the drilling enterprise within the system of assigned indicators. Fulfillment and overfulfillment of the targets, which means faster completion of wells and a longer time of operation of the new petroleum production capacity in the given calendar period, should be the principal indicator governing the allocation of funds to the drilling enterprise.

This system for fund allocation went into operation on an experimental basis in 1977 in those petroleum regions doing massive drilling. The following indicators have been used (Tatneft' Association):

- 1) the normative time completed wells are operational (in well-days);
- 2) labor productivity (estimated according to the calculated amount of work to be done);
- 3) growth of petroleum and gas reserves.

The normative operational time of wells in the Tatneft' Association is determined on the basis of the assumed 10 days of operation for wells made available in the reporting month, while actual operational time is based on the actual time remaining to the end of the month when the wells are made available. The indicator of normative well operational time, which is the result of fulfillment of targets for the number of wells completed, and expenditures of time for the cycle of operations involved in completing the wells can serve as a standard for measuring the operating time of new petroleum production capacities. This indicator, which is weighted for productivity, is also used to determine petroleum production for new wells. The share of drilling enterprises in building up the association's funds on the basis of rates per ton can therefore be determined. The actual payment of incentives to drilling enterprises (that is, allotment of their material incentive fund) can in this case be based on rates expressed in rubles per well-day of normative time. Moreover, in the aim of intensifying motivation to deliver wells ahead of schedule, the amount per well-day awarded for overfulfillment of normative time may considerably exceed the base amount for fulfillment of the plan. Up to 80 percent of the incentive funds of drilling enterprises may be built up on the basis of amounts paid for fulfillment of the normative operational time of completed wells. In petroleum regions where the amount of drilling activity is relatively small, the number of completed wells is set as the indicator governing allocation of funds to the UBR [drilling administration] on an experimental basis (the Ukrneft' Association). The amounts of funds allocated per completed production well vary from enterprise to enterprise. Fulfillment of the profit plan is a mandatory condition for transfers to the incentive funds of drilling enterprises.

The work done during the last 10 years to perfect the economic mechanism in the petroleum industry has considerably strengthened financial motivation. The relative share of incentive payments in the industry was supposed to rise to 10.5 percent in 1976 according to the plan, and it actually rose to 10.7 percent. The highest levels of incentive payments were achieved in Glavyumenneftegaz and Tatneft' and Orenburgneft' associations, i.e., in petroleum regions supplying the bulk of petroleum production in the industry and practically the entire annual growth of production. The role of payments from the material incentive fund increased particularly, and this made it possible to increase bonus payments to workers of the industry's production associations approximately twofold over that period. The payment of bonuses to engineering and technical personnel and employees reached 38.4 percent of salary rates, while the payment of bonuses to workers was 28.5 percent of wage rates.

The incentive system adopted in the petroleum industry in 1977 has considerably strengthened the effectiveness of economic methods of management by creating a general financial motivation on the part of collectives of production associations to achieve the ultimate goal--production of petroleum and gas at minimum total labor inputs. In 1977 the relative share of incentives in the industry was supposed to rise to 11.4 percent in the industry according to the plan. In the three petroleum regions mentioned above the planned level of the share of incentives ranged between 12.5 and 12 percent. In 1977 the system of incentives for additional output over and above the plan was also radically revised. During the Ninth Five-Year Plan only personnel of the NGDU credited to the material incentive fund an additional amount per ton of petroleum produced over and above the plan.

Personnel in drilling, transport and auxiliary activities were motivated to overfulfill the plan on the basis of the fund-regulating indicators of their own production operations (calculated profit, profitability, and so on). Beginning in 1977 economic conditions were created in the industry that promoted maximum mobilization of production capabilities by setting a higher per-ton rate of transfers to the material incentive fund for every ton of petroleum on the basis of an additional target. Since additional petroleum production by virtue of improved use of available wells and by carrying out a number of measures to increase their productivity yields an extremely large benefit to the national economy, the rate per ton of transfers for additional production was set at a higher level--2 rubles 50 kopecks. This rate per ton was the only source of incentive for overfulfillment of planning targets for the entire collective of the production association. This kind of incentive system for additional petroleum production also stimulates the most optimal combination of capacities of basic and auxiliary production operations within the economic complex of the petroleum production association and a consequent reduction of total labor inputs. Fulfillment of additional targets for petroleum production on the basis of the maximum size of transfers per ton will be the principal means of enhancing motivation during the 10th Five-Year Plan. In the first half of 1977 additional petroleum production increased the size of the material incentive fund in Glavtyumenneftegaz by 20 percent, and the proportional growth was sizable in a number of other petroleum regions. The crediting of 1 ruble 13 kopecks to the fund for social welfare and cultural programs and housing construction for every additional ton of petroleum produced is also quite important; this fund is not large enough in the industry as a whole. Because of the conditions under which they develop, the enterprises of the petroleum industry are developing uninhabited regions of the country and are building and maintaining the housing and facilities for cultural and consumer services they need. According to current regulations, 60 percent of the planned amounts of the fund for social welfare and cultural programs in housing construction goes to finance capital construction, while the other 40 percent of this fund is inadequate for other needs, i.e., to maintain facilities for cultural and consumer services, to pay travel authorizations for medical treatment, to subsidize hot meals for production workers, and so on. To an industry

with relatively difficult working conditions it is extremely important to meet the needs of worker welfare, and application of the higher rate per ton for additional petroleum production is helping considerably to replenish the amount of the fund for social welfare and cultural programs in housing construction earmarked for those purposes. The production association may extend supplemental allocation of the material incentive fund on the basis of additional allocation of the material incentive fund for the association to subsidiary and auxiliary subdivisions and operations supporting the process of petroleum production. Use of higher rates per ton for transfers to incentive funds on the basis of supplemental petroleum production is possible only if there is above-plan profit. Since the total profit of the production association is the source from which the planned size of incentive funds is actually obtained, this system enhances the association's financial interest in the economic results of one form of activity which is unfavorable from this standpoint--drilling. To a certain extent the use of this kind of economic lever stimulated (soon after its adoption in the second quarter of 1977) rectification of the situation with fulfillment of the profit plan by drilling enterprises of petroleum production associations. Whereas in the first quarter of 1977 the unsatisfactory economic performance of drilling enterprises seriously disrupted the payment of incentives in some production associations, total profit of associations even on the basis of the results of the first half of 1977 increased so much that the payment of incentive funds was provided for in almost all petroleum regions. This is having a favorable effect on operation of the procedure for building up incentive funds on the basis of the rates per ton as an effective lever for raising production efficiency.

The higher rates per ton, which are used only as a supplemental target for credits to the material incentive fund on the basis of petroleum production (but is not used for overfulfillment of the target), should also encourage the adoption of strenuous additional targets (on the initiative of the production associations).

In the year of the 60th anniversary of the Soviet state an economic incentive system has been worked out and is now functioning in the petroleum industry which reliably guarantees financial motivation of the industry's production associations to intensify production, to speed up scientific-technical progress, to raise labor productivity and to achieve optimum final results for the industry--deliveries of petroleum and gas to the national economy.

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## STRATEGY OF SOCIAL DEVELOPMENT OF COLLECTIVE OUTLINED

Moscow NEFTYANIK in Russian No 10, 1977 pp 1-3

[Article by V. Sopin, chief of the Administration for Organization of Labor, Wages and Worker Cadres of the Ministry of the Petroleum Industry: "Strategy of Social Development of the Collective"]

[Text] The policy of insuring a significant upswing in the material and cultural level of the people has found vivid reflection in the materials and decisions of the 25th CPSU Congress, which not only outlined the prospects and trends of projects in this field, but also determined concrete ways of resolving them. The vast program of social development of society is in need of refinement at different levels of management of the national economy, in its individual units: in sectors, production associations and at enterprises.

The social development of the collective of an enterprise, of an association is one of the basic features of its activity. The need for planning of social processes in labor collectives is called forth by the necessity of accounting and evaluating the role of social factors in the labor and social activity of enterprises and organizations, calculation of the possibilities of growth of production, satisfaction of the social needs of the members of the collective, and solution of the problems of management. According to the data of sociologists, just owing to social factors labor productivity can increase by 35-40 percent (without taking into account the changes not subject to direct calculation).

At the present time there has been an increase in the scales and volumes of production activity, the economic relations of the enterprise have become more complex. Under the influence of scientific and technical progress there is a constant renewal of the technological processes which improve management in all units of industry. These factors affect the character and the content of labor. Demanded to an increasingly greater degree from the direct participants in the production processes is the use of scientific knowledge in their labor activity, and the results of labor depend more and more on the attitude of the workers to their work.

The plan of social development of the collective is a program document, in which the strategy of social development of the collective is formulated. In order for this strategy to be well-thought-out and sound, representatives of all functional and line subdivisions, of public organizations and the broad masses of workers at the enterprise should participate in the creation of the social plan.

The plan of social development of the production collective concerns all of the most important aspects of its activity. Compilation of the plan assumes analysis of information from the standpoint of the demands and needs of the members of the collective, their relations to various aspects of labor activity. An important feature of the social plan is its complexity, which makes it possible to compare and balance in one document different aspects of the activity of the labor collective.

At the basis of improvement of the social structure of the production collective, including the collective of oil-industry workers, and of the creation of favorable opportunities for all-round development of the personality of the workers are the changes taking place in the character and content of labor, and namely regarding the degree of increasing the level of mechanization and automation of production processes, the transition from simple labor to complex. Therefore an important indicator of the social development of the collective is the rise in the proportion of workers engaged in skilled and highly-skilled labor.

A significant place in the plans for social development of the collectives is occupied also by measures connected with improving the working and living conditions of the workers, with protecting their health. Measures for improvement of the sanitary and hygiene conditions of labor are aimed at lowering the number of people working under unfavorable conditions, at eliminating circumstances threatening the health of the workers and so on. The plan for social development also includes questions connected with an increase in wages, with distribution of incentive funds, with utilization of the fund for social and cultural measures and housing construction. It should be recalled that one of the basic indicators of the sociocultural level of the workers is the degree to which they are provided with comfortable well-arranged housing.

Under today's conditions in the oil regions especial significance is taken on by questions of protection of the environment. It is necessary to organize the extraction of oil so that this process will not have a negative effect on the condition of the air and water basins, or on the territories on which the production objects of oil extraction are located.

One of the most important features of organizational work with the workers is an increase in their sociopolitical and production activity, improvement in the social relations in the collective, and fostering in the workers a communist attitude toward labor.



If it is considered that one of the chief functions of the plan for social development is integration of the production collective, development in the workers of a sense of an organic relation with their own enterprise, of participation in all of its affairs, it is clear that the overall indicator of the effectiveness of all social measures will be the level of personnel turnover, that is, the value, the inverse degree of attraction of workers to their production collective.

Personnel turnover on the average for the sector during the period from 1971 to 1976 was reduced by 3.3 percent. However personnel turnover continues to be of significant detriment to individual enterprises.

VNIIOENG [All-Union Scientific Research Institute of Organization and Economics of Petroleum and Gas] jointly with sociologists from Glavtyumenneftegaz [Main Tyumen' Oil and Gas Administration] worked out a method which makes it possible to study well the causes of personnel turnover in the petroleum industry. According to this method the causes can be divided into two groups: external--the specifics of the conditions and regime of labor in the sector, climatic conditions; internal--organization and conditions of labor on the job site, conditions of everyday living, the content and character of labor.

Since action on external factors cannot be very significant, it is necessary to direct the main attention to exposure and analysis of the internal factors. An analysis of the chief motives for personnel turnover in Glavtyumenneftegaz showed that the significance of production motives all together exceeds the significance of the nonproduction motives. Therefore reduction of the number of people released is a problem to be resolved both on the level of the enterprises and of the associations of the sector.

The planned large increase in the volumes of extraction of oil in the Tenth Five-Year Plan places before the sector a number of complex tasks, the more so that in the majority of oil regions the deposits have entered or are entering the late stages of development, when the extraction of oil will either be reduced or in the best case will be stabilized.

For successful fulfillment of the tasks set forth it is necessary, apart from the growth of new capacities, to devote especial attention to questions of introduction of new equipment and technology, to raising labor productivity at enterprises exploiting already opened deposits. A large part in this should go to the incorporation of plans for social development of the enterprises and associations.

Whereas in the Ninth Five-Year Plan the plans for social development were worked out only in Glavtyumenneftegaz and in the Kuybyshevneft' [Kuybyshev Oil] and Tatneft' [Tatar Oil] associations, at the present time they already exist in all associations of the sector, with the exception of Komineft' and Gruzneft' and the all-union industrial associations. In the Kuybyshevneft', Permneft', Orenburgneft' and Nizhnevolzhskneft' associations

the plans of social development have been worked out both for enterprises of the basic and the auxiliary production facilities.

However in a number of associations not even all the enterprises of the basic production facility have social development plans. Thus, for instance, in the Bashneft' association plans have been developed only for 16.6 percent of the enterprises, and in Kaspornneft' they have been developed for a few more than half the enterprises. One of the reasons for this is the weakness of the sociological service.

At the present time there are over 200 sociologists working in the sector. In the Azneft' and Tatneft' associations the number of sociologists is 27 and 41 people. At the same time, sociological services have not been set up in the Gruzneft' and Kirgizneft' associations. In the Bashneft', Udmurtneft' and Stavropol'neftegaz associations 1-2 people are occupied with questions of social planning. Such a situation indicates the inadequate understanding of the urgency of social planning by the administration of enterprises and associations.

In the years of the Ninth Five-Year Plan it was possible to reduce significantly the use of manual labor owing to realization of social development plans (sections regarding introduction of new equipment and technology, implementation of measures for lowering the share of manual and unskilled labor). Thus, for instance, in the Tatneft' Association the number of workers performing work by hand was reduced from 27 percent in 1970 to 23 percent in 1975.

There was a great rise in the general educational level of workers in the sector. However the number of young people who do not have a general secondary education is still great: out of 215,000 people who have not reached the age of 30, 73,000 do not have a secondary education. There are especially many such young people in the old oil regions-- in the associations of Dagneft' (39 percent), Stavropol'neftegaz (43 percent), Grozneft' (35 percent) and Turkmenneft' (49 percent). It is necessary to solve this problem in the very near future. Provided by the plans for social development of collectives is a broad program of vocational training of personnel in courses and in educational combines, in different schools of economic knowledge and advanced methods of labor. The success of this program will depend greatly on the increase in the general educational level of the workers.

In the past five-year plan a great deal of money was directed to implementation of measures for increasing the availability of machinery and for improving sanitary and hygienic conditions of labor. Thus, by the start of the Tenth Five-Year Plan the level of mechanization in basic and auxiliary production was increased to 72 percent, and the level of provision of production with standard sanitary and domestic facilities was increased to 92 percent. This made it possible to reduce the number of those working

under difficult working conditions and as a result to lower the level of industrial injury (in the Tatneft' association this indicator was lowered by almost 30 percent during the five years).

There was an improvement in medical and communal services for oil industry workers, and in the organization of their leisure. Put into operation in the sector in the Ninth Five-Year Plan were 4,162,000 square meters of housing, children's institutions to accommodate 20,196, schools to accommodate 48,092, hospitals with 3,066 beds, clubs with 6,520 openings, and polyclinics for 5,660 visits per shift. Much has been done, but still much has to be done in the current five-year period. During 1976-1980 it is envisaged to introduce 7 million square meters of housing, children's institutions with 35,440 openings, hospitals with 3,990 beds, and polyclinics for 11,140 visits per shift.

Being conducted at enterprises of the sector in addition to improvement in social planning is the compilation of plans of the social development of whole cities and rayons, where the leading sector of industry is oil extraction. Social development plans have already been worked out for the cities of Nizhnevartovsk, Surgut, Nefteyugansk, Strezhevyy, and Al'met'yevsk.

No longer needed at the present time is special evidence to confirm the relation between social measures and an increase in production indicators. Thus, for instance, reconstruction of operating and construction of new preschool institutions contributes to bringing into the labor collective new workers from among the members of a family. The establishment of medical centers, preventive medicine centers, and the conduct of health measures reduce the sickness rate and, consequently, the losses of working time. Improvement of cultural and educational work decreases personnel turnover. A rise in the general educational level of workers affects the broadening of the professional outlook and speeds up the mastery of vocational skills.

In order to insure fulfillment of the tasks facing the sector in the field of social planning, it is necessary to conduct a number of organizational measures: to create sociological support services, to improve coordination of the work on social planning and conduct of sociological research, and to develop a series of methods materials. Strengthening the sector's sociological services will yield the opportunity to embark on working out a plan for social development of the sector.

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## SOCIOLOGY APPLIED TO ENTERPRISE MANAGEMENT

Moscow NEFTYANIK in Russian No 10, 1977 pp 5-6

[Article by G. Savosin, chief of the division of methods of training worker cadres and sociological research of the Central Scientific Research Laboratory (TsNIL) of the Kuybyshefneft' Association: "Sociologists Help To Manage Production"]

[Text] The sociological service of the Kuybyshefneft' Association, which is composed of five sociologists and five methods specialists, has taken a very active part in working out the plan for social development of the collective for 1976-1980. During the three years of existence of the division of methods of training worker cadres and sociological research, its colleagues have done about two dozen studies which have played a large part in working out the plan for social development for the current five-year plan and also in the making of administrative decisions on different problems of the social life of the collective. Determined namely by the interests of management was the cycle of research connected with problems of communist education of young people, with increasing the role of the foreman in production, personnel turnover and others.

The work which was extensive and interesting for its results was conducted by a sociology group studying, on the instructions of the management of the association, the status of ideological and educational work among the working youth.

At the present time young people make up a significant part of any working collective, they are its active force, the main reserve of replenishing the skilled personnel. At enterprises and organizations of the Kuybyshevneft' Association 20 percent of the workers are young people. It is clear that the production successes of the collective depend significantly on the level of their labor and creative activity, initiative and communist consciousness.

The level of education of working youth today is 2-3 grades higher than as a whole for the association. Thus, for instance, in the Perfomayneft' [First of May Oil] NGDU [Oil and Gas Extracting Administration], 26 percent of all those working have a higher, secondary and secondary specialized education, but among the youth the figure is 63 percent. Naturally, being

established is a practice whereby boldly being advanced in important sections of production are young people who have higher general educational and specialized training.

In the course of the research it is possible to reveal the inadequately sound relation of the youth with production, expressed in a short length of labor service, and the low occupational preparedness of young workers. Thus, in the Pervomayneft' NGDU 35 percent of the youth have a term of service of 1-2 years, and in the Otradny UBR [Drilling Administration] the figure is 22 percent. Such features of young workers as the absence of life experience, the absence of firm convictions, are the reason that the proportion of violators of labor discipline among the youth is higher than among working people as a whole. In the Pervomayneft' NGDU falling to the share of young people is 45 percent of all recorded violations, in the Otradny UBR, 28 percent, and in the Zhigulevskneft' NGDU, 25 percent.

The results of the studies by the sociology group were valued highly by the management of the association. At a council of managers of enterprises in the association measures were adopted to improve the general educational and vocational training of young workers, their political education, and the organization of daily life and leisure. These studies determined one of the most important directions in the group's work for the following years. A social portrait of the young oil industry worker was worked out, an analysis of the quality make-up of the tutors of young people was made, and training of young people was organized.

At the present time the division is engaged in working out vocational-skills descriptions and vocational records for the leading workers in the occupation of oil-industry workers, which will be an integral part of the work begun in the association to strengthen the role of production collectives in the labor training and vocational guidance of pupils of schools under their tutorship. Enterprises of the association are helping more than 20 schools in oil regions and cities of the oblast. It is no secret that graduates of secondary schools still go unwillingly to work in the oil fields. These developments have been used in working out management decisions--a resolution-order of the leadership of the association and the oblast committee of the trade union of the oil and gas industry about increasing the role of production collectives in the vocational guidance of students of the schools under their tutorship.

It must be said that this is not the limit of the division's projects regarding communist training of young people. On the request of the Pokhvistnevskiy rayon committee of the CPSU a sociological study was made of the organization of the free time of young people of Pokhvistnevskiy Rayon. The division's work in this direction contributed to the fact that the Kuybyshevneft' Association was awarded a certificate of the All-Union Central Council of Trade Unions, the Central Committee of the All-Union Lenin Young Communist League and the State Committee for Vocational and Technical

Education according to the results of the All-Union Review-Competition of the status of training and advanced training of young workers.

The second important direction of the division's work is the development of recommendations for further increasing the role of foremen in the management of production. A study was made of the quality make-up of the foremen (there are about 700 of them in the association), the conditions and organization of their labor, and their role in the organization of production and the training of the labor collective. The obtained results helped to reveal many interesting features. Thus, the length of the working day of foremen lasts from 11 to 14 hours, and more than 30 percent of the working time is spent for non-plan jobs, the reason for which is incorrect and inadequate supply of materials, tools, parts, and poor communications. Far from all the foremen are satisfied by the organization of the job sites, the time-limit of the work, the regime of labor and rest. As a result of this work the oblast committee of the trade union of workers in the oil and gas industry passed a special resolution on improving the work with foremen, and in the association a long-range plan of measures for increasing the role of the foreman in production was worked out. Developed by the division's methods specialists was a training program for courses to improve the skills of the foremen.

Among the other work of the division, deserving of attention are the studies of personnel turnover which are conducted through continuous questioning of people who are leaving; the work to improve the system of training and advanced training of cadres; analysis of the effectiveness of individual forms of technical training of cadres; and development of a system of recording violations of labor discipline.

Today it is no longer necessary to prove the necessity of sociological research. The task now is to have the information gleaned through sociological studies used to the maximum for the purpose of improving the management of production.

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## WAYS TO KEEP PERSONNEL IN OIL INDUSTRY STUDIED

Moscow NEFTYANIK in Russian No 10, 1977 pp 4-5

[Article by A. Mal'kov, candidate of medical sciences, head of sector of concrete sociological research of VNIIOENG, and V. Pivovarov, candidate of medical sciences, senior scientific associate of the sector of concrete sociological research: "Personnel Turnover and Ways To Stabilize It at Oil Industry Enterprises"]

[Text] In order to increase the effectiveness of public production and accelerate the growth of labor productivity in the Tenth Five-Year Plan it is necessary to have more effective utilization of manpower resources. One of the measures in the solution of this important problem, it is stressed in the Basic Directions of Development of the USSR National Economy for 1976-1980, is a substantial reduction in personnel turnover. Keeping personnel at an enterprise is a necessary condition of its successful operation and profitability. This explains the present great attention to the problem of the study of personnel turnover.

Personnel turnover, as is known, is caused by two basic factors:

- a) by the dissatisfaction of the worker with some conditions of his activity at a given enterprise--with the organization of labor, sanitary-hygienic conditions at the job site, wages, the lack of prospects for growth, relations with the management, the social-psychological climate in the collective, and conditions of personal life and day-to-day living connected with the industry (the housing problem, lack of provision of children's preschool establishments, the remoteness of the place of residence from the enterprise, the shift system of work and others);
- b) by the dissatisfaction of the enterprise with the given worker from the standpoint of his skills, education, labor discipline, behavior in the collective and so on.

Turnover of working cadres causes great losses of working time in sectors of the national economy, it leads to excess outlays for training and

retraining of professional cadres, and it violates planning principles in the distribution of manpower resources. According to available data, the labor productivity of workers in the course of the two weeks prior to dismissal is reduced by 25 percent, and for newly accepted workers it comes to more than 50 percent of the average for the enterprise in the course of at least three months. The frequent exchange of workers at industrial enterprises is one of the main causes of idle periods and breakage of equipment, tools, means of minor mechanization, violation of the technological process of production, accidents, an increase in rejects and so on.

It is necessary to make an in-depth study of the causes for turnover of worker personnel in order to work out measures for lowering economic losses, which the enterprises bear due to this negative process, and also in order to create at the enterprises those conditions under which dissatisfaction of the workers with their situation at the enterprises would not appear and, consequently, there would not be the very conditions for personnel turnover.

Each sector of the national economy has its own production and social specifics, which predetermine the features of the process of turnover of worker cadres at the enterprises. No exception to this is the oil industry, which has a number of characteristic features peculiar only to it: the performance of operations at open industrial sites, connected with the constant action of unfavorable climatic conditions; the considerable distance of production sections from population centers, which leads to great losses of time on travel to the job site and back, the shift nature of the work, shortcomings in cultural and recreational services and food supply and, in a number of cases, the absence of the opportunity to increase the education of the oil workers due to the remoteness from scientific and cultural centers and so on. All this has a substantial effect on personnel turnover among the oil-industry workers, which is also indicated by the fact that at enterprises of associations in the petroleum sector the percent of turnover is rather high even at the present time.

A study of the turnover of worker cadres at enterprises of the oil industry, conducted by VNIIOENG [All-Union Scientific Research Institute of Organization and Economics of Oil and Gas] showed that the greatest percent of turnover falls to such occupations as assistant driller of a UBR [drilling administration] (39.1-45.8 percent), assistant driller of a TsKRS [expansion unknown] (30.4-34.4 percent) and a tower assembler (34.0-38.7 percent). As a rule highest of all is the turnover among young workers (up to the age of 30), with a term of work at the given enterprise of up to one year and with an incomplete secondary education.

The sector of concrete sociological research of VNIIOENG jointly with sociologists of Glavtyumenneftegaz [Main Tyumen' Administration of Oil and Gas Industry] developed a card for the leaving worker under the heading "What Is Keeping You From Working?" which is intended for surveying all workers leaving enterprises of the oil sector at their own request. This card, including such questions as what are the labor conditions at the job



site, the nature of the work, the organization and regime of labor, wages, everyday life at the production facility, the sociopsychological climate of the collective and certain others, is a source of information about the effect of concrete aspects of work at the enterprise on the release of the workers.

An analysis of the data obtained using the indicated cards showed that the group of workers with service of up to one year inclusively has the maximum intensity of turnover. Turnover in this group exceeds almost two-fold the average level of personnel turnover. For instance, among the dismissed workers at enterprises of Glavtyumenneftegaz the given group comprises 57.4 percent. With an increase in the term of work at an enterprise the intensity of turnover is reduced continuously.

When considering turnover in relation to age, it can be remarked that most inclined to changing places are the workers up to 30 years of age. For instance, in the same Glavtyumenneftegaz the workers up to 30 years old comprise the bulk of the workers released--65.6 percent; with an increase in age in all associations the intensity of actual turnover is reduced.

The intensity of turnover of workers without families is significantly greater than among workers with families. It should be noted that for workers without families the working conditions have greater significance than for workers with families.

A significant reduction in turnover during the years of the Ninth Five-Year Plan was attained by the enterprises of Glavtyumenneftegaz, Komiyeft' [Komi Oil Administration] and Belorusneft' [Belorussian Oil Administration]. The lowest turnover of worker cadres by comparison with all other associations of the sector and with the average sector indicators was in the Sakhalinneft' Association. It should be noted that the associations listed above conducted serious work to find out the motives and reasons causing turnover of worker cadres at their enterprises.

The motives for leaving reflect very different factors connected with working and living conditions. Often they express a subjective attitude toward the causes of turnover. However the motive coincides with the reason when the worker has a certain goal which he hopes to realize by transferring to another enterprise. Among this type of motive one can include housing conditions, kindergartens and children's nurseries, wages, climatic conditions and so on. If the cause for leaving an enterprise is dissatisfaction with the work, then the motive most often only partially reflects the structure of the reason, coinciding only with the grounds for dismissal.

Conditionally the individual motives for leaving can be joined in three groups: production motives, nonproduction motives and personal reasons. The group of production motives includes conditions connected with production: working conditions, vocational and skills conditions,

organization of labor, wages, remoteness of the work from the place of residence, conditions of life at the production facility, and social relations.

The nonproduction motives include conditions that are not controllable at the level of the enterprise: housing conditions, presence of children's preschool institutions, conditions of living in the city (settlement), climatic conditions.

Personal reasons include family circumstances, state of health, desire to go to a place of new development and so on.

An analysis of the motives for leaving showed that for associations where the "What Is Keeping You From Working?" card was approved, the significance of production motives all together exceeds the significance of the non-production motives. It is necessary to consider the circumstance that the "wages" and "housing conditions" motives for leaving in the total comprises from 25.3 percent in Kombineft' to 46 percent in Glavtyumenneftegaz. And this means that the rest of the motives for leaving, connected with production and living conditions, have more essential significance. Reduction of the number of dismissed workers according to this group of motives is a task that is completely resolvable both at the level of the enterprises and of the association, and the development of measures for stabilization of worker cadres should be directed to this.

The level of satisfaction with the work plays a great part in the making of a decision by a worker about leaving an enterprise. Therefore when analyzing the turnover of worker cadres it is necessary to approach in greater depth the study of the motives connected with production. Here it should not be forgotten that the motives for leaving cannot fully reflect the whole complex of interconnected production conditions.

An analysis of the structure of factors in turnover was made on the basis of evaluations of the concrete aspects of work made by released workers who indicated how they were satisfied with different aspects of the work and also how this affected their leaving. The materials obtained in the course of approval of the "What Is Keeping You From Working?" card showed that the person's term of work at the given enterprise has essential significance.

With a decrease in the term of work at the enterprise there is an increase in the significance of such factors as wages, organization of labor, vocational and skills conditions, and the character of the work. These factors have maximum significance in the group of workers with a term of up to one year, the group which is the most mobile (its turnover exceeds the average level of turnover by more than two-fold). With an increase in the term there is a rise in the significance of working conditions on the job site, conditions of living in the city (settlement), and the presence of children's preschool institutions. Analysis of different factors individually according to each age group shows that with a decrease in the

term of service and the age there is an increase in the role of factors connected with the conditions of production. With an increase in the term of service and the age there is an increase in the role of factors connected with living conditions.

In our opinion, the method of analysis of the causes of turnover of worker cadres according to the degree of influence of working and living conditions on leaving yields more reliable results than analysis of just the motives for leaving, which was used by many enterprises of the sector prior to approval of the "What Is Keeping You From Working?" card. For example, in Glavtyumenneftegaz the remoteness of the work from the place of residence and the presence of children's preschool institutions had been considered as one of the chief motives for leaving. The method showed that in fact these are immaterial and occupy one of the last places. Many analogous examples can be cited both regarding Glavtyumenneftegaz and regarding other associations. In this way, by adopting as a tool for investigating personnel turnover the developed and approved card for the released worker, "What Is Keeping You From Working?", the enterprises of the oil industry will be able with its aid to reveal the motives and reasons for turnover of worker personnel, which will help them in the development of specific measures to reduce the turnover.

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## TUTOR SYSTEM HELPS TRAIN YOUNG OIL WORKERS

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[Article by A. Nikitin, chief of the personnel division of the Udmurtneft' Association, and V. Shklyayev, senior engineer-sociologist of the association: [Let Us Develop the Tutorship Movement"]]

[Text] When intensive development of petroleum deposits began in the Udmurt region, it was necessary first of all to solve the personnel problem. The assistance of neighboring petroleum regions and associations by skilled cadres made it possible to create the backbone of the collective of the Udmurtneft' Association, however a still greater share of the worker cadres of oilmen was acquired owing to local labor resources (at present more than 2,000 Udmurts are working at enterprises of the association), that is, from among people who previously were not acquainted with the oil industry. It is known that the labor of oilmen differs greatly from the labor of workers in industrial enterprises located in large cities. Namely for this reason in the first years of development of the oil industry in the Udmurt region personnel turnover was very high.

In 1976 the collective was relatively stabilized, but the level of personnel turnover still remained twice as high as at other industrial enterprises of Izhevsk. As a rule, there were very many young people among those who left the association. Thus, in 1976 the basic percentage of those who left the association were young people up to 30 years old. If it is considered that today in the association's collective more than half of the people working are young people up to the age of 30, and among those newly arrived in the association are also many young people, it is possible to understand why much attention is given in the association to questions of development of the tutorship movement. Counting on the youth, fostering in them a love for the occupation, teaching professional abilities and skills, and keeping the youth in the collective are impossible without this effective means.

Prior to 1976, tutorship in the association as a movement was uncoordinated and was developed at the enterprises by the efforts of solitary enthusiasts.

In the second half of 1976 in the association two events took place which can boldly be considered the starting point of organized development of the tutorship movement. The first was the publication of the resolution-order about development of tutorship in the association and the second was the holding of the first meeting of tutors in the association.

Set up at each enterprise was a "Journal of Accounting of the Work of the Enterprise Council of Tutors," reciprocal contract-pledges were introduced which officially bound the interrelations of the tutor with the young worker, and there was distribution of the "Materials of the First Meeting," acquainting workers of the association with the problems of tutorship, and of the "Diary of a Tutor."

The work done contributed to that even four months after the meeting the detachment of tutors increased to 150 people. However the matter is not in the quantity. We are now making the first steps in setting up tutorship in the association and we have still rather large reserves of quantitative growth. Now facing us are questions of the quality of the movement, of increasing its effectiveness.

The training of youth is a delicate and complex matter. It requires not only the desire, but also certain preparation, pedagogical knowledge and skills, a great world outlook, sincere warmth, and the ability to find the key to each person. In order for our tutors to master the art of training young people, so that in their person we will have good production teachers, it is planned periodically to hold seminars for the tutors with the invitation of specialists from VUZ's and schools, the system of vocational and technical education, and chief specialists of the association.

The first one-day seminar was held in the association in April of this year. Attending it were more than 130 tutors, who heard the opening address by general director of the association V.I. Kudinov, and the speeches of the deputy chairman of the council of tutors of one large industrial enterprise who told about the experience in organizing the tutor system at his plant, the speech of a senior legal consultant of the association who treated in detail the topic "Labor Laws for Youth," the speech of the senior inspector of the Industrial ROVD [expansion unknown], who set forth the experience in work with juvenile delinquents, and the librarian for vocational courses who made a survey of the literature on tutorship.

In speaking about the quality and an increase in the effectiveness of the movement, we should stress that for this it is necessary to develop the work in many directions. It follows to put in the first positions the work on vocational guidance and increasing the prestige of the working professions, the solution of the problems of adaptation (adjustment) of the young person by creating a healthy sociopsychological climate, and the development of not just vocational, but also other (cultural, athletic and other) interests, and so on.

Selection of an occupation is a complex and responsible moment in the life of the young generation. This complexity is stipulated both by the large number of occupations and specialties, and by the orientation of the youth to an occupation in mental labor. For instance, a study of the life plans of graduates of schools in Ufa, Novosibirsk, Leningrad and other cities showed that about 80 percent are preparing to study further, 12 percent are preparing to study and work and only 8 percent are preparing to work.

The choice of an occupation is made by a young person in that period when he is insufficiently prepared for making such a decision, when he is experiencing a difficult period of formation of personality, of acute physical and psychological changes. It follows especially to note the fact that young people choose an occupation far from always the one and in the number required by society. Let us recall the "principle of the upside-down pyramid," advanced by the Novosibirsk sociologist V.N. Shubkin. It consists in that if we take and then construct the actual needs of society with regard to occupations in the form of a pyramid, on the top of this pyramid will be the occupations of pilot, writer, cosmonaut, political figure; below will be the occupations of teacher, physician, and engineer; and further the occupations of fitter, lathe-hand, and regulator. To be found in the lowest part of the pyramid are the occupations with low-skilled labor, the demand for which is still great.

Surveys of young people conducted by Shubkin show that enjoying the greatest popularity are exactly those occupations of which there are few--the occupations of highly-skilled mental labor. But the toughest competition occurs exactly in these occupations. If a pyramid is constructed from the desires and preferences of the youth, it turns out to be the reverse, overturned, which serves as one more proof of the contradictions between the school-home orientation and the needs of society.

How is the detachment of oil-industry workers formed? By what motives are the young people guided who come into the association?

As yet the answers to these questions do not exist in the scientific literature. You can look through the partially annotated bibliographic index of the literature for 1966-1975, "Social Problems of Labor and Labor Collectives," put out by the Institute of Sociological Research, and you will not find even one (!) work devoted to problems of selection of the occupation of oil-industry workers, or of orientation of the young people to these occupations.

In the Udmurtneft' Association definite work is being conducted to popularize the occupations, to attract young people in the ranks of oil-workers. This means excursions by students in senior classes of schools of general education to the deposit, meetings with model production workers, "Dedication to Workers" holidays, contests of professional skill and other measures. However all of this is borrowed from the arsenal of the industrial enterprises, but it is on a level that is much lower than at the plants, since we have no clearly developed system. Ideally the work should be conducted in such a

complex: enterprise--assisted school--base PTU [vocational-technical school]--ZhEK [housing operations office]--culture center. Unfortunately, the oil-industry workers do not have the opportunity to conduct work on vocational guidance in the indicated complex.

As experience has shown, one of the effective forms of training young people is the celebration of worker dynasties. In our association we have the Khasanov family. R.G. Khasanov has worked in the oil industry for about 30 years. He was the first drilling foreman to begin to develop the oil wealth of the Udmurt region. Rafgad Gadiyevich's labor has been marked by the Order of Labor Red Banner and the Order of Labor Glory of the III degree. Following in the father's footsteps is his son El'fat Rafgatovich Khasanov, who is presently working as a driller. This worker dynasty in the association is far from the only one, and we are striving to train the youth following their example.

A no less important role in communist training of young people is played by the evenings of labor glory, the celebration of people having a labor jubilee. Such traditions, as A.S. Makarenko has written, beautify life. "Without such traditions," said Anton Semenovich, "proper Soviet training is impossible. Why? Because it is impossible to have proper training without a mighty collective, one which respects its dignity and senses its collective personality."

However the first impressions of a young worker about a new collective should be reinforced by daily painstaking concern on the part of the tutor, striving to fashion out of an inexperienced worker a highly-skilled specialist in as short a time as possible.

An inexperienced young fellow came into Sergey Vorob'yev's drilling administration. He was sent to the section for repair of turbine drills. The partners with whom Sergey came to work turned out to be people who were in the oil industry by chance, and it is not known what his fate would have been if he had not come across fitter and repairman Arkadiy Fedorovich Kuz'min. Arkadiy Fedorovich was a participant in the Great Patriotic War, a veteran of the oil industry, a holder of the Badge of Honor order. In three years of joint work with A.F. Kuz'min, Sergey Vorob'yev became a highly skilled specialist, he completed courses for foreman and at present he is working as a mechanic for the repair of turbodrills.

Thanks to the concerned attitude toward young workers many of them have become leading specialists, skilled workers.

The following conclusion can be drawn from these examples: organization of the work of an enterprise regarding vocational guidance is of great importance, but if at the enterprise itself this is not reinforced by practical work for organization of the working conditions of young people, by the careful attention of the collective to each person newly arriving at the enterprise, the effectiveness of the work on vocational guidance will be reduced considerably.

In conclusion we desire to dwell on certain questions of further development of the tutor system in the association.

The basic tasks of the councils of tutors of the enterprises and the association in 1977 are to complete the filling of detachments of tutors at all enterprises of the association, to continue the training of tutors, and to develop socialist competition both among the tutors and among the collectives of the enterprises for the best organization of the tutorship of young workers.

In 1978 we are planning to achieve the appointment of a tutor for each young worker, to develop collective tutorship, to set up a gallery of the best tutors in the association, to coordinate the work of the enterprises for vocational guidance and, ultimately, to attain a significant reduction in personnel turnover among the youth.

However our most important task is to make tutorship a mass movement, to turn the association's collective of many thousands into one large family with its own traditions and history of development, in which each person would be able to say with pride: "I am from the Udmurtneft' Association."

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GEORGIAN FORESTRY MINISTRY--[Editorial Report LD] Tbilisi ZARYA VOSTOKA in Russian 10 December 1977 front-pages two Georgian SSR Supreme Soviet Presidium decrees dated 7 December 1977 transforming the Georgian SSR Council of Ministers State Committee for Forestry into the Georgian SSR Ministry of Forestry and appointing Shot Ivanovich Chalaganidze Georgian SSR minister of forestry.

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